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A Colliery Haulage Problem.

BY FRANK MC ENTEE.*

Many of the pioneer mines of the Western Pennsylvania bituminous field in operation at the present time, in attempting to compete successfully with newly opened mines equipped with modern plants, present some complicated problems in regard to the reduction of mining costs. The Dagus No. 1 operation of the Northwestern Mining and Exchange Company, at Dagus Mines, Penn., furnishes an interesting example. This mine was opened in 1891, and is now hauling coal underground against heavy grades for a distance of over two miles.

The location of the present workable territory is such as to suggest that the best solution would be to take out the coal with favorable grades from the other side of the divide. This, however, is impracticable, since it would involve the abandonment of about 10 miles of railroad, the construction of a new tipple, and several miles of railway. Had the transportation facilities permitted any other solution, the mine would probably never have been opened to the dip. The coal is reached by a 17 deg. slope 800 ft. in length, up which a rope delivers trips of 15 one-ton cars to the tipple. Mules formerly gathered the loads to the foot of the slope. A 3-ft. seam, however, is quickly worked out, and about five years ago, when the tonnage steadily decreased, a new gathering point, known as the "turnout," was made 5000 ft. from the foot of the slope, and another tail-rope system was installed. There is an average grade of 2 per cent. against the loads for the entire distance along this road. The rope hauls on an average 40 cars per trip.

From this second turnout still heavier grades were encountered, and it soon became evident that mules would not be able to keep up the tonnage. The mine did not warrant any large expenditure, but electric haulage was decided upon. A Ridgway 150-kw., 250-volt generator, which had been used for several years at another mine operated by the company, was moved and set up on the surface about 5000 ft. from the turnout. The dynamo, which is belt-driven by a 200-hp. Ball engine, now furnishes power for two 10-ton General Electric Company traction locomotives, eight Jeffrey undercutting machines, a 300 gal. per min. Worthington turbine pump, and a 3-ft. Murphy fan placed inside the mine as a "booster" for the main air current. The additional cost was consequently only that of the locomotives and pump, and for installation expenses. These two locomotives are delivering about 800 tons per 10-hour day to the turnout and are taking the places of at least 60 mules.

The controlling grade for a full-loaded trip is 3 per cent. for a distance of about 900 ft. Each locomotive averages 40 loads up this grade. At times as high as 50 loads are handled. It is interesting to remark here that a two-mule team formerly brought up three cars only.

In order to make the 21 trips required daily, the locomotives have no time for gathering from the rooms. The present practice is for the men to push the loaded cars from the face of the rooms to the headings; the locomotive bringing in the empties pushes all the loads ahead of it to the face of the heading. The men then switch the empty cars into the rooms temporarily. After the trip has gone out, most of the cars have to be switched again, and pushed to the working rooms, nearer the face of the heading. The disadvantages of this method are evident, but the additional cost of mules or gathering locomotives is prohibitive.

Each motorman is allowed about 50 min. to gather his trip from several headings, and return to the turnout. In order to do this he must travel a distance of over two miles.

It is not to be expected that a generator originally designed for operating coal-cutting machines, and now furnishing power for two locomotives, eight coal-cutting machines, a pump and a fan, will be able to keep pace with an ever increasing haulage. The problem now presented is how to augment the power most economically. A storage battery is under consideration. This, it is hoped, will enable the dynamo to be run at a constant delivery, reduce the wear and tear on the engine and generator caused by the sudden throwing on and off of the heavy loads, and give the motors the benefit of the generator's maximum power at all times.

It is now evident that the electric haulage plant has resulted in an appreciable saving over the previous system of mule haulage. The chief disadvantages encountered so far, are those arising from the hand distributing of the empties, and gathering the loads, as well as the shorter life of the mine cars due to rough handling, a fault which will no doubt be eliminated as the motormen become more experienced in the work.

*Mining Engineer, Du Bois, Penn.

Rail vs. Water Transportation.

The fallacy in the frequently reiterated claims made for the cheapness of water transportation as compared with railway transportation is commented upon by *Engineering News*. The cost of rail transport always includes the cost of making and maintaining the roadway, and in comparing the cost of water transport with rail transport the cost of the waterway itself is almost invariably omitted. The reason this is done, of course, is that the cost of making and maintaining harbors and canals, and of dredging and otherwise improving natural lake and river channels, is borne by the taxpayers and is not paid as a part of that freight charge like the railway rate.

It is unfortunately the case that erroneous notions on this subject are widespread, and projects are constantly brought forward for waterways and improvements of waterways which are wholly unjustifiable, and whose materialization would mean the misuse of enormous amounts of the taxpayers' money.

There is said to be great need in Queensland for a cheap and effective machine to save the finer and more flaky portions of molybdenite. In dressing the ore the larger lumps of molybdenite are broken off from the attached quartz by hammers, washed and put aside for bagging. The finer stuff is screened and that remaining on the screen roughly jigged in water. The heavier lumps collect at the bottom, but the more flaky material, owing to its buoyancy in water, cannot be separated from lighter quartz. A great deal of it is wasted, as there is no sale for anything but clean mineral.

The production of spelter in the United States in 1905 was about 202,000 tons.

Test of a Centrifugal Pumping Unit.*

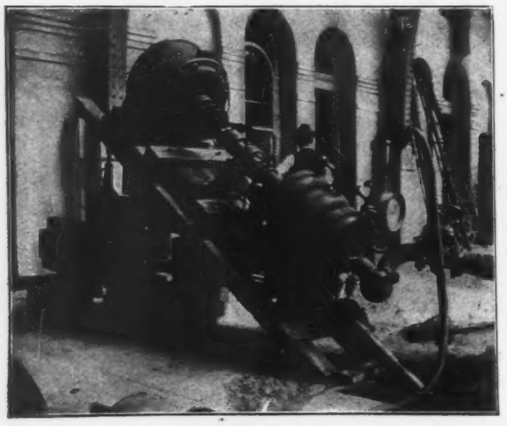
BY PHILIP E. HARROUN.

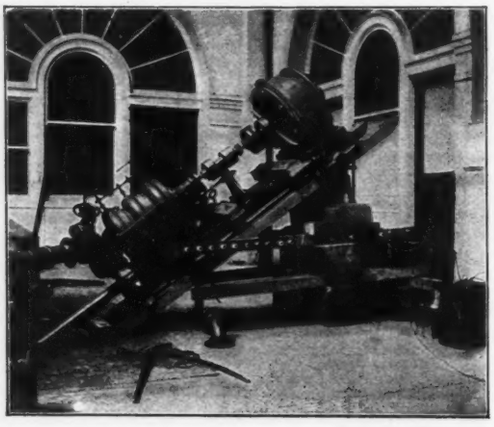
For several years many of the makers of centrifugal pumps on the Pacific Coast have been claiming that they secure an efficiency of 75 and 80 per cent. and even higher, for their pumps, but have never been able to obtain authentic data which would support these claims. In fact, I have thought that an efficiency of from 55 to 60 per cent. was seldom exceeded, and that the average efficiency of the commercial pumps turned out was far less.

During the autumn of 1904, I was on a trip through the San Joaquin valley and had the opportunity of seeing in operation some eight or ten centrifugal pumping units, and with the available instruments at hand, endeavored to obtain their efficiency. These were all two-step pumps, with one exception, which was a three-step. They were all direct-connected to induction motors. With two exceptions, they were being used for water-supply service to the various towns in which they were located, and were pumping to stand-pipes or tanks a constant volume under a practically constant head, and were in continuous service. The two exceptions were irrigating units, under the same conditions as to volume and head, but in service probably an average of 6 months in the year. As in these instances the service was practically continuous and both the volume and head were constant, these units were probably selected from stock, or designed to give a maximum efficiency for the volume and under the head in each particular case. The observed efficiencies of these units ranged between 25 and 45 per cent., with an average of about 35 per cent. I had some hesitation in accepting fully the individual results, owing to my having no facilities for verifying the instruments used, and the necessity of accepting the statement of the owners as to certain essential factors; at the same time, I believe that the results obtained are practically correct. In view of these facts, I was especially interested when the opportunity arose to test the unit under consideration.

This consisted of a three-stage centrifugal pump, direct-connected to a 25-h.p., 2-phase, 60 cycle, 200-volt induction motor, making 1,120 r.p.m. It was built for use as a mine-drainage or sinking pump, and to operate in an incline shaft. The illustrations, Figs. 1 and 2, show the unit in detail as it was set up for testing, and also indicate the approximate angles of operation. The contract for furnishing this pump, simply provided that the pump should deliver 250 gal. per min. at a head of 200 ft., and that a standard 25-h.p. motor, as above described, would furnish all the power required.

Upon being retained by the purchasers to test the unit, it was examined in the place where it had been set up and was being operated by the makers. Under these conditions the unit was apparently delivering 240 gal. per min. at a head of 180 ft., and the failure of the unit to meet the prescribed requirements was stated by the makers to be lack of speed in the motor due to the excessive transforming of the current used. Under these circum-





FIGS. 1 AND 2. PUMP SET UP FOR TEST.

TABLE 1.—TEST OF THREE-STEP, CENTRIFUGAL PUMP, WITH 4-IN. SUCTION AND 4-IN. DISCHARGE.

Test No.	Speed.	Watt Meters. A.	Watt Meters. B.	Kilowatts.	E. H. P.	Weir reading.	Weir zero.	h.	Gallons per minute.	Pressure Gauge. Pounds.	Pressure Gauge. True.	Vacuum. Inches.	Vacuum. True.	Volts. A.	Volts. B.	Amperes. A.	Amperes. B.	Efficiency, combined unit.
1	1 086	13.25	12.70	25.95	34.8	1.2365	1.016	0.2205	390	60	60	9	10	205	198	71	76	42.5%
2	1 110	13.5	12.9	26.4	35.4	1.227	1.016	0.211	366	65	65	8	9	208	201	71	75	41.7%
3	1 099	13.0	12.4	25.4	34.0	1.2075	1.016	0.1915	317	70	70	7	8	204	196	72	70	40.2%
4	1 103	12.3	11.9	24.2	32.4	1.1915	1.016	0.1755	279	75	75	6	7	204	194	71	69	39.4%
5	1 112	11.65	11.3	22.95	30.8	1.176	1.016	0.160	244	80	80	6	7	207	200	65	63	38.6%
6	1 112	10.65	10.5	21.15	28.3	1.155	1.016	0.139	198	85	85	5	6	206	198	60	59	35.9%
7	1 135	9.95	9.8	19.75	26.5	1.132	1.016	0.116	152	90	90	5	6	204	198	57	55	31.2%
8	1 146	9.4	9.3	18.7	25.1	1.109	1.016	0.093	111	95	95	5	6	205	199	54	52	25.2%
9	1 126 to 1 131	10.8	10.5	21.3	28.55	1.152	1.016	0.136	190	87	87	5	6	208	197	62	50	34.2%
		10.9	10.7	21.6	28.95	1.152	1.016	0.136	190	87	87	5	6	.....	.....	.....	.....	
		10.9	10.7	21.6	28.95	1.152	1.016	0.136	190	87	87	5	6	.....	.....	.....	.....	
		10.9	10.7	21.6	28.95	1.152	1.016	0.136	190	87	87	5	6	.....	.....	.....	.....	
		11.1	10.85	21.95	29.4	1.152	1.016	0.136	190	87	87	5	6	.....	.....	.....	.....	
		11.2	10.9	22.1	29.6	1.152	1.016	0.136	190	87	87	5	6	.....	.....	.....	.....	
	Mean	.....	.....	.....	29.07	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Gate shut tight....		7.6	7.7	15.3	20.5	0	.....	0	0	.....	.....	.....	.....	.....	.....	.....	.....	
Water drained out.		0.6	1.3	1.9	2.55	0	.....	0	0	.....	.....	.....	.....	.....	.....	.....	.....	

NOTE.—Tank Measure.
Rise in Level. 167.00
Time. Q, in second-feet.
10 min. 0.424.
0.424 sec.-ft. = 160 gall. per min.

* Abstract of a paper read before the American Society of Civil Engineers, New York, Feb. 7, 1906.

stances, I refused to conduct the test until the requirements specified should have been more nearly approximated.

It was also found that the facilities for testing offered by the makers were not adequate, and I then sought permission to conduct the test at the Mechanical Laboratory of the University of California. This permission was readily granted by the Departments of Agriculture and of Mechanics, and, after considerable objection on the part of the makers, their sanction was also obtained.

Before the pump was shipped to the laboratory for the test, it was retained by the makers some two weeks, and during that time changes were made by them in the pump, or motor, or both, to bring them up to the requirements of the contract. Immediately prior to its shipment it was examined by myself while in operation by the makers, and, according to their measurements, not verified by myself, it was apparently fulfilling the requirements of the contract.

At the laboratory the unit was set up and run during the test by a representative of the makers, and all possible precautions were taken to insure the correctness of the results obtained; there can be no question on that score. For the measurement of power, Weston watt meters were used. In the determination of the discharge, a 2.50-ft. contracted rectangular weir was used, and the results were calculated by the Francis formula,

$$Q = C\,(b - 0.2\,h)\,h^{\frac{3}{2}},$$

using for C a co-efficient determined by J. N. Le Conte for this particular weir, which gives slightly greater results than the Francis co-efficient. The weir discharge was also checked by volumetric tank measurements, and with an agreement of within 1 per cent.

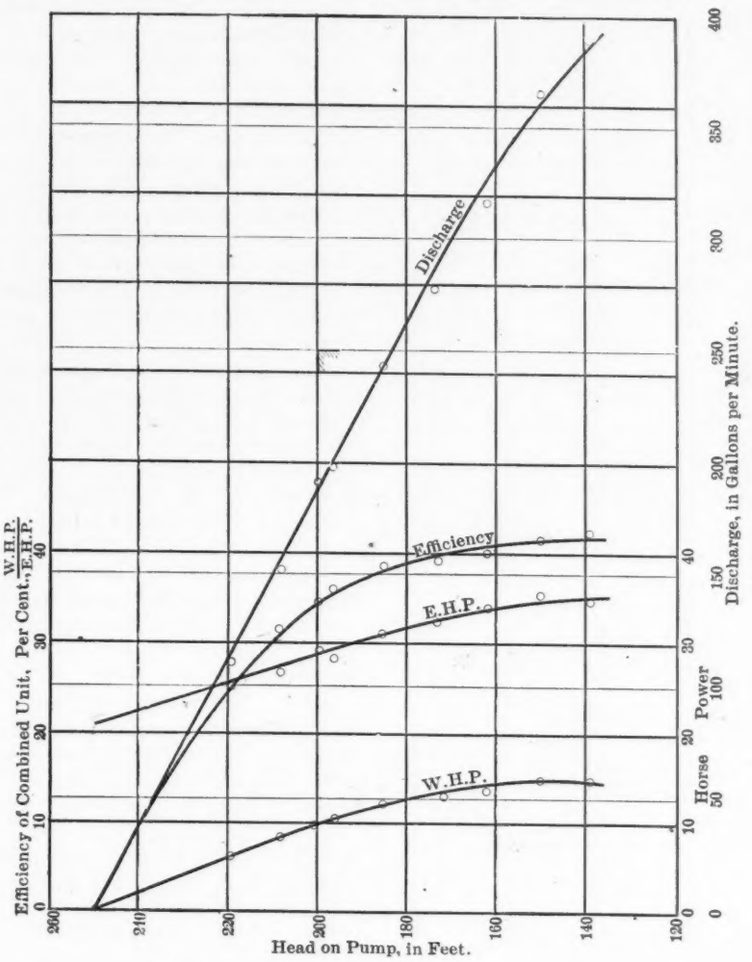


DIAGRAM NO. I.

Table 1 gives the results obtained, and the diagram, No. 1, covers the same items. At the head for which the pump was designed, 200 ft., the discharge was 190 gal. per min., and the combined efficiency was 34.2 per cent.; or, taking the motor at 90 per cent., 38 per cent. was the efficiency for the pump.

It is very probable that the maker of this pump considered it his best effort to meet the conditions imposed in the contract. This is indicated by the changes made in it during the two weeks it was held by him prior to the test, and also by the probability that he would not have submitted it for such test had he deemed it otherwise. That it fell so far short of the maker's expectations, is due, to some extent, to the crudeness of the apparatus by which the shop tests are made. It is much to be regretted that the test was not conducted through a greater range, but it seems probable that this pump should be rated at 400 gal. per min. at 130 ft. head, and, allowing 90 per cent. efficiency for the motor, 47 per cent. would be the maximum efficiency of the pump at this rating.

This test is specially interesting, in view of the approximate tests previously mentioned, and, in connection with them, it is believed that 35 per cent. may be taken as a fair average of the efficiencies obtained in the actual operation of these units in this section.

It seems reasonable to expect that, for so small a unit as that tested, a pump efficiency of from 55 to 60 per cent. should have been obtained, or, say, 50 to 54 per cent. for the combined unit. If $50 per h.p. year is taken as the cost of power, the annual charge for the unit tested is $1450, as against $1000 for a unit of 50 per cent. efficiency, and the annual saving in cost of power, by a unit of 50 per cent. efficiency, would have returned the entire first cost of the one tested in two and one-half years.

TABLE 2.—TEST OF 2½-INCH CENTRIFUGAL PUMP.

Revolutions per minute.	Total pressure.	Gallons per minute.	Electrical horse-power.	Water horse-power.	Wire efficiency.	Approximate pump efficiency.
1 520	31	204	11.7	3.68	31.4	40.2
1 568	32	182	10.85	3.39	31.3	40.3
1 566	36	146	10.72	3.06	28.6	37.1
1 591	38.5	113.3	9.78	2.54	26.0	34 3
1 549	39	106.5	9.67	2.42	25.0	33.2
1 560	39	100.0	9.64	2.27	23.6	31.5
1 557	39	83.7	9.00	1.9	21.1	28.4
1 568	41	43.5	7.92	1.04	13.15	18.1
1 562	42.5	26.1	7.6	0.645	8.5	11.72
1 610	45	0	7.03	0	.....	.....

TEST OF 2-INCH COMPOUND CENTRIFUGAL PUMP.

1 192	51.25	112	13.27	3.34	25.2	31.5
1 217	52.75	108.3	13.38	3.33	24.9	31.0

[In the discussion on this paper, J. Richards proposed a series of tests upon several pumps, made for experimental purposes and not for sale. His remarks follow:

These pumps were arranged with adjustable and removable dispersion vanes, with throatways finished smooth, and

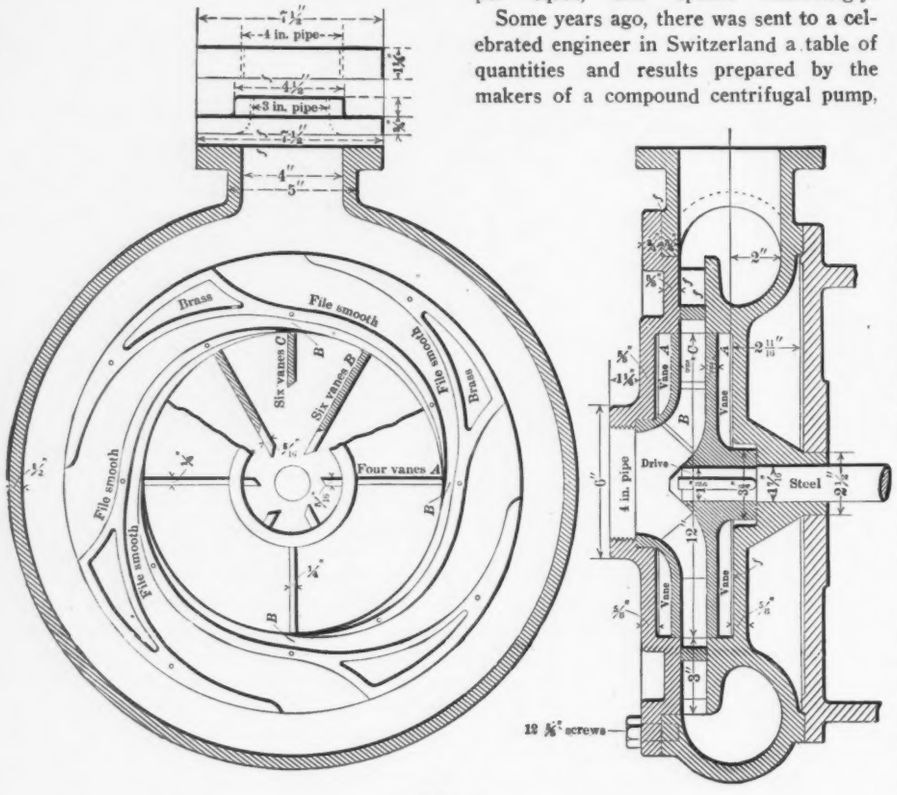


FIG. 3.

adapted for a number of different experiments, including relative efficiencies.

The experiments proposed were as follows:

1.—3-in. pump. With open throat, guide vanes removed, tested at various heads and rates of speed. Cut-off points of the balancing vanes on the back until the impeller is in equilibrium, and no thrust.

2.—3-in. pump. With guide vanes set for ¼-in. throats.

3.—3-in. pump. With guide vanes set for ½-in. throats.

4.—Remove outside vanes and open impeller at the sides; then repeat Experiments 1, 2 and 3.

5.—Connect 4-in. discharge to this pump, remove dispersion vanes, and test for heads from 10 to 50 ft.

Experiments 6, 7 and 8 to be defined later.

9.—2-in. pump. With dispersion vanes removed. Cut off back vanes on this impeller to balance, as in the 3-in pump.

10.—2-in. pump. With dispersion vanes for ¼-in. throatways.

11.—2-in. pump. With dispersion vanes for ⅛-in. throatways.

12.—Second 2-in. pump. With single issue (Pump No. 3). This is a novel combination, now the subject of controversy among engineers.

13.—3-in. four-stage pump. Eight experiments, with one, two, three and four impellers, with and without dispersion vanes, at presures from 10 to 150 lb. per sq.in., and speeds accordingly.

Some years ago, there was sent to a celebrated engineer in Switzerland a table of quantities and results prepared by the makers of a compound centrifugal pump, that is, two pumps in series. This table was prepared, no doubt, in entire good faith, but the laconic reply received from the Swiss engineer was discouraging.

In substance, he said, "These quantities will not in this country produce the result claimed, and if they do in California it must be owing to the climate."

Another case may be mentioned. Two small pumps were purchased from different makers to operate against a head of 100 ft., and were guaranteed to operate at an efficiency of 70 per cent.

The pumps were put into the hands of a careful engineer engaged in such tests, and the efficiency attained at the head named was nearly identical with that given, 34 per cent. Table 2 gives the results of the tests.

Centrifugal pumping is fast falling into a scientific form and a standard construction, modified, of course, by the circumstances of use. There seem to be left but two constructive features and two phenomena of operation with which to deal.

The constructive points are, means to conserve the kinetic energy of the water's revolution, or its tangential energy, as it is sometimes called; and to produce an equilibrium of the impellers to avoid lateral thrust.

The phenomena are, the effect produced, on a stream of water moving at high velocity, by roughness or irregularity of surfaces; and the kinetic stability or tendency of a body of water in rapid revolution to remain in one plane.

Besides these features and phenomena there are the conditions of adaptation and endurance, which, in a sense, are determinate, and are not problems, but matters of skill and engineering knowledge.

The practice on the Pacific Coast, while early and extensive, cannot be called advanced. The pumps required, being mainly for irrigation and rough uses, are good enough, perhaps. They are, to a great extent, bought and used for a few months of the year, and stand neglected for the remainder of the time. Such things are determined by natural adaptation and must be so judged.

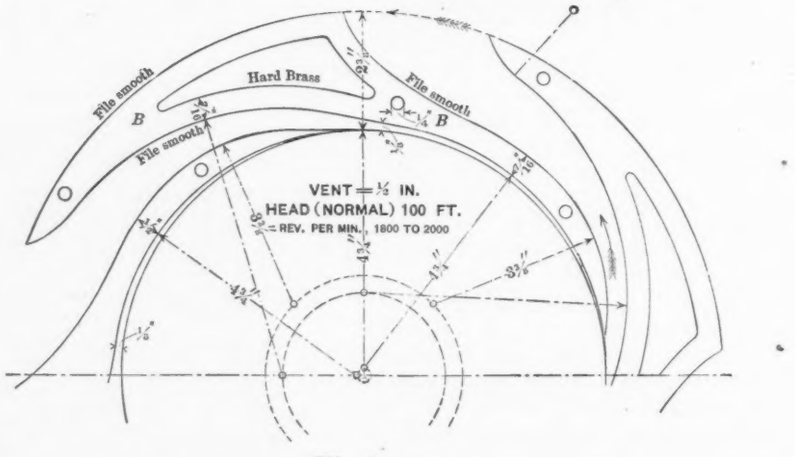


FIG. 4.

A centrifugal pump, finished in its operating zone, like the ones shown in Figs. 3 and 4, or provided with dispersion vanes, must cost at least twice as much as one without these features, and the added efficiency may or may not warrant the more expensive construction. The machines illustrated are of a purely experimental nature, admitting of a dozen or more modifications.]

Windy Arm Mineral Locations.*

BY W. F. ROBERTSON.† *

The attention of the Provincial Government was drawn during the past summer to the reports of very successful prospecting on Windy Arm, a branch of Tagish lake, the claims being situated very near the boundary line between British Columbia and Yukon Territory, the 60th parallel of north latitude. In consequence, I, as Provincial mineralogist, on my return from the Bulkley valley on October 10th, was requested to proceed to investigate these reports and to determine as to the location of the claims. I therefore left Victoria by the next boat, sailing on October 16th, arriving at Skagway on the 22d and at Conrad City on the 24th.

Routes of Access.—The district in question is reached from southern British Columbia by steamer to Skagway, Alaska, thence over the White Pass and Yukon Railway to Carcross—formerly called Caribou Crossing or Narrows. Steamers from Victoria and Vancouver to Skagway run every week, with additional steamers from Puget Sound ports, on which the first-class fare is $30. From Skagway to Carcross the White Pass Railway runs a passenger train every day, except Sunday, the year round. The railway fare is $12.25. From Carcross to Conrad City, the terminus on Windy Arm of the aerial tramway from the Conrad Consolidated Mines, is a distance of about 14 miles by navigable water. During the summer season transportation is provided here by the steamer *Gleaner,* which makes two trips a week, or by rowboat, while after the ice forms travel is by sleigh over the ice.

Anticipating the necessity for direct railway connection into this new camp, the White Pass Railway has caused two surveys to be made for a branch from its main line. One line starts from Carcross and follows the shore line of Windy Arm to Conrad City, while a second survey leaves the main line at Log Cabin, following down the watershed to Tutshi lake; thence over a very low divide, only a few hundred feet high, to the south end of Windy Arm, the west shore of which it follows up to Conrad City. This latter route, although much longer, is said to be favored by the railway, as it approaches the summit of the Pass by an easier grade and is reported to admit of cheap construction, while from the southern end of Windy Arm a spur could be run along the east side of the Arm to Conrad mountain, should the mineral claims there located, upon development, fulfil the promise of the present surface showings.

The Lewes river, the most important tributary of the Yukon river, has its source immediately to the north of the Chilkoot and White Passes, which mark the dividing line between Alaska on the south and the British possessions on the north. Through these passes and by this waterway has been the course of travel to the Yukon goldfields. The river may be said to begin in Tagish lake, which receives the waters of Bennett, Atlin and a number of smaller lakes of the district. These lakes are all cut by the 60th parallel of north latitude—the boundary line between British Columbia and Yukon Territory—and are, consequently, partly in each territory. In longitude they lie between the 134th and 135th west of Greenwich. Windy Arm is an arm of Tagish lake extending in a southerly direction for nearly ten miles from a point about five miles east of the Caribou narrows, where Bennett lake flows in. About one and a half miles of the southern portion of the Arm is in British Columbia.

The general course of the Arm is parallel with that of Bennett lake—the two bodies of water being separated by a mountain ridge which attains an elevation of some 4,500 ft. above the lakes, which are themselves 2,200 ft. above sea level. The separating ridge is about six to seven miles across in a direct east-and-west line.

The first of the mineral discoveries already referred to was made on the Windy Arm slope of this mountain ridge, about two to three miles north of the 60th parallel, and in this vicinity only has there been any extensive development of the surface prospects. Such development, however, as time has permitted to be made at this point proved so eminently satisfactory as to stimulate prospecting over the entire district, with the result that, during the past summer and autumn, a large number of claims have been recorded along the range and on a parallel range lying to the east of Windy Arm. As most of these newer prospects were discovered only late in the season, no very definite information as to them is obtainable, further than that the samples from surface croppings brought in by the prospectors give very encouraging assays and seem to indicate that from the vicinity of the more developed claims there is a mineral belt perhaps three miles broad and extending southward into British Columbia for some distance.

Mineral Development.—As has already been noted, the older, and, in fact, the majority of the mineral locations, together with all the material development at present accomplished, is in the Yukon Territory, and, consequently, outside the jurisdiction of the Province of British Columbia. It was, therefore, by the courtesy of the owners—particularly of J. H. Conrad—that I was permitted to inspect the workings and see the results so far obtained.

From the shores of Windy Arm the hills rise rapidly, their lower levels being so covered with wash and slide as to have confined all prospecting to the upper levels—that is, from 1,500 to 4,000 ft. above lake level. Timber line in this part of the country is found to be at an altitude of from 4,500 to 5,000 ft. above sea level, or about 2,500 ft. above the lake.

When I visited the camp in the last week of October, snow completely covered the hills down to 1,500 ft. above the lake, so that none of the surface workings were visible, and as work in winter could be carried on only under ground, only those properties sufficiently far advanced to permit of this were found in operation.

The property upon which the most important development has been done is that held by the Conrad Consolidated Mines, an organization of which J. H. Conrad is president. This company holds a group of 8 or 10 claims, situated at an elevation of from 3,000 to 4,000 ft. above the lake, in a comparatively level basin among the higher peaks some four miles in a direct line back from the Arm. The surface here is covered with heavy wash or slide, in which rich float was found in such a well-defined line as to induce pits and cross-trenches to be dug until the vein was eventually struck in the solid formation upon the Montana, one of the central claims of the group. On this lead a drift had been driven for from 200 to 300 ft., attaining a depth estimated at about 100 ft. From this level stoping had been carried up in places for about 30 ft.

As seen in these workings, the vein was found to be a clearly defined quartz fissure vein between two distinct walls. The hanging wall is the general country rock of the vicinity—a fine-grained, basic, volcanic rock, too much altered to admit of closer determination—while the foot-wall is a very much decomposed, rusty, coarsely crystalline, igneous rock, probably a diabase. The vein, as exposed, had a thickness of from 2 to 5 ft., averaging about 3 ft. The strike of the vein was found to be N. W. and S. E., with a dip to the S. W., into the hill, averaging about 25°. On the foot-wall was found a layer from 3 to 12 in. thick of galena embedded in "carbonates," or iron oxides, from which some astonishingly high assays have been reported, not infrequently running as high as 800 oz. in silver, with $20 in gold, to the ton.

Above this is the quartz proper, from 12 to 30 in. thick, mineralized sometimes more and sometimes less, with iron pyrites and silver and antimony sulphides from which the management report assays higher in gold but lower in silver, the whole, however, averaging well. The manager estimated the entire vein to run over $25 to the ton, which estimate seemed reasonable. Shipments of sorted ore were being made down the hill by the pack-train which brought up supplies, and these shipments were reported as running over $100 to the ton in gold and silver.

* *Bulletin* No. 1, Provincial Bureau of Mines, British Columbia.
† Provincial Mineralogist, Victoria, B. C.

CAMP AT MONTANA MINE ON MONARCH MOUNTAIN, WINDY ARM.

I took samples from the upper and lower portions of the vein, representing the two classes of ore rather than the average. These I brought to Victoria, where they were assayed by the Government assayer. The results obtained were as follows:

No. 1—Galena from the lower portions of the vein:—Gold, $13.60; silver, 442 oz. to the ton.

No. 2.—The vein quartz well mineralized:—Gold, $7.60; silver, 113 oz. to the ton.

No. 3.—The "fines" broken in sorting the ore from both portions of vein:—Gold, $17.60; silver 160 oz. to the ton.

On the strike of the vein as indicated by the Montana workings, a tunnel was driven in on the Mountain Hero, the adjoining claim, through wash for 80 ft when the solid formation was struck, in which a 50 ft. raise was made, when the vein was found containing similar quartz ore, seemingly proving the vein and orebody for 1,800 ft. along its strike. The management reports the vein as distinctly traced through at least seven claims by float and occasional croppings, upon which some work has been done.

The company has a Riblet aerial tramway 3¾ miles long almost completed from the Montana Group to the shore of Windy Arm at Conrad City, and has constructed at the mine a stone bunk and cook-house for the workmen, and will, consequently, be able to continue development work all winter with a small force of men.

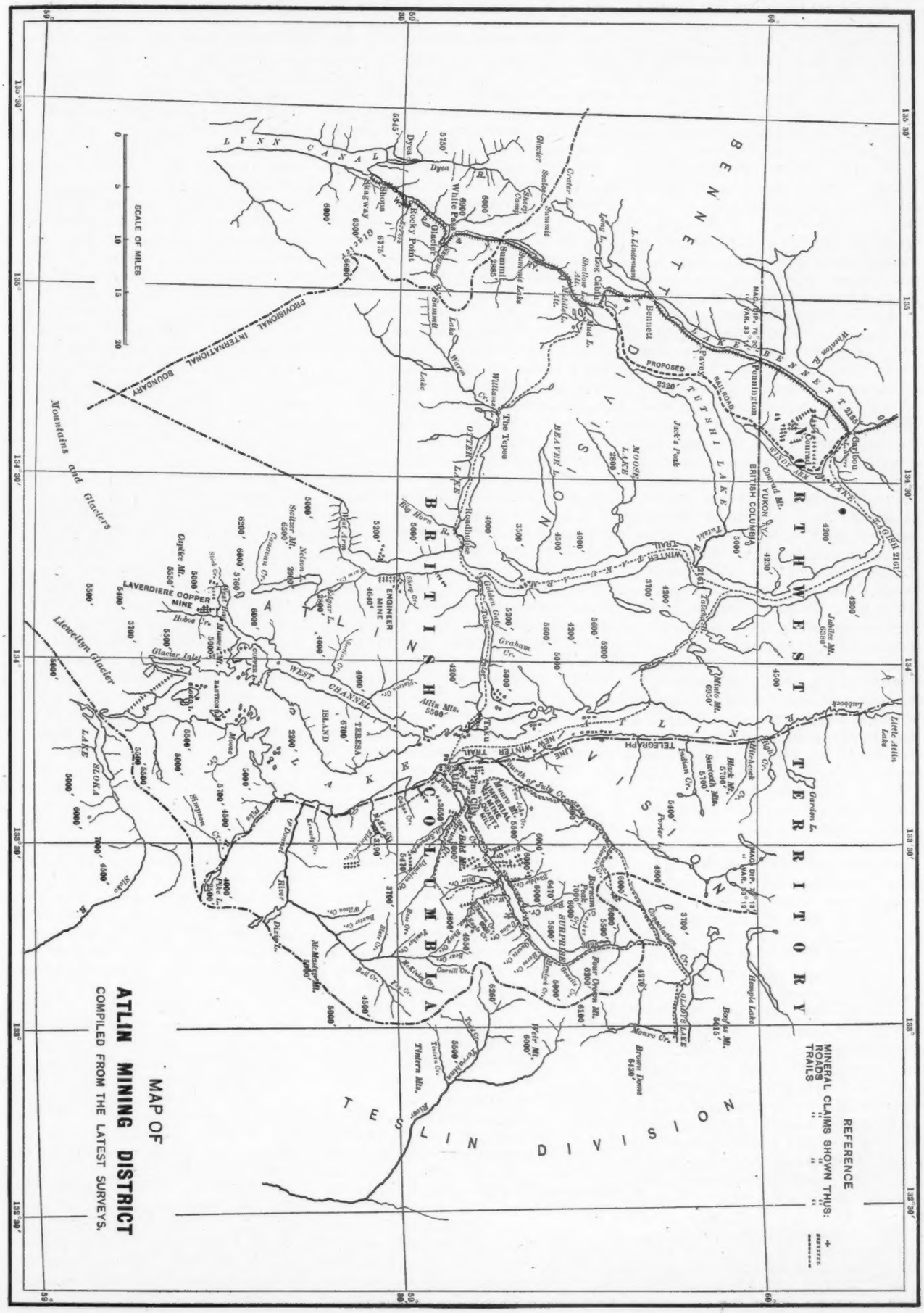
An allied syndicate, the J. H. Conrad Bonanza, has done considerable development in the way of open cuts on the Venus vein, which lies about half a mile south of the Montana. The country here is cut by the deep cañon of Pooley creek, apparently a fault line, which has enabled the vein to be prospected at a depth of over 1,000 ft. The strike of this vein appears to be about southwest, with a dip to the west. In the same vicinity this syndicate is also developing a parallel vein on the Uranus claims, on which it is reported some 600 ft. of work has been done, developing good ore.

From both of these properties tram lines have been surveyed and the right of way cleared down to Windy Arm, at a point some 2½ miles to the south of Conrad City.

There are probably 100 more claims located on this slope, on which, as yet, only slight surface development has been done, but in many instances most encouraging results are reported.

From the plans seen of the various properties, it would appear that there are at least two main series of veins, an east-and-west series and a north-and-south series, which latter series, to the north of Pooley Cañon, bears to the northwest, and south of the cañon to the southwest. It could not be learned that as yet any development had been done on any claims on the west side of Windy Arm south of the 60th parallel. On the east side of the Arm, on Conrad mountain, which is cut by the 60th parallel, a large number of claims were staked late this past summer, but these have not yet received much development, being difficult of access and at an elevation high above the lake.

These locations, however, indicate that the mineralized belt will be found to pass


MAP OF
ATLIN MINING DISTRICT
COMPILED FROM THE LATEST SURVEYS.
REFERENCE
MINERAL CLAIMS SHOWN THUS:
ROADS
TRAILS
SCALE OF MILES
0 5 10 15 20
PROVISIONAL INTERNATIONAL BOUNDARY
LYNN CANAL
Dyea
Skagway
White Pass
Rocky Point
Glacier
Summit
Lake
Bennett
Lake Bennett
Caribou
Conrad
Carcross
Lake
Tutshi Lake
Moose Lake
Beaver Lake
Otter Lake
The Tepee
Jack's Peak
Big Horn
Boulder
Nelson
Stellar Mt.
Clarke Mt.
LAVERDIERE COPPER MINE
ENGINEER MINE
Hobo
Glacier Inlet
Llewellyn Glacier
Mountains and Glaciers
WEST CHANNEL
ISLAND
TERESA
Atlin Mts.
Atlin
Pike L.
Slate R.
Graham
Golden Gate
Gold Run
Spruce Cr.
Discovery
Pine Cr.
Boulder Cr.
Bald Mt.
Surprise
Burnham Peak
Four Queens Mt.
Monro Cr.
Peter Mt.
Boulder Mt.
Mosquito Lake
Garden L.
Little Atlin Lakes
Lubbock
Mt. Minto
Black Mt.
Sawtooth Mts.
Tedom Cr.
Whitehorse
Porter L.
Jubilee Mt.
Carmacks
Yukon
British Columbia
Teslin
Tutshi
Winter Trail
New Winter Trail
Telegraph Line
Fourth of July Cr.
Atlin Mining Co.
Atlin Mining Co. Mill
Atlin Mining Co. Dam
Atlin Mining Co. Ditch
Atlin Mining Co. Flume
Atlin Mining Co. Tramway
Atlin Mining Co. Power House
Atlin Mining Co. Boarding House
Atlin Mining Co. Office
Atlin Mining Co. Stable
Atlin Mining Co. Blacksmith Shop
Atlin Mining Co. Store
Atlin Mining Co. Assay Office
Atlin Mining Co. Dwelling
Atlin Mining Co. Bunk House
Atlin Mining Co. Cook House
Atlin Mining Co. Engine House
Atlin Mining Co. Boiler House
Atlin Mining Co. Machine Shop
Atlin Mining Co. Carpenter Shop
Atlin Mining Co. Paint Shop
Atlin Mining Co. Tool House
Atlin Mining Co. Powder House
Atlin Mining Co. Fuse House
Atlin Mining Co. Dynamite House
Atlin Mining Co. Caps

into British Columbia, and that on such extension there is a promising field for the prospector.

The shore of the Arm was followed down to its southern end, and the ridge to the west was found to continue unbroken, save where cut into by a couple of creeks.

The geological conditions existing in the vicinity of the montana claim appeared to continue to the southward into British Columbia territory and past the southern end of the Arm. The only exception to this was that, within half a mile of the south end of the Arm, a bed of hard, dark slate cropped out on the west shore, its contact with the overlying igneous rocks being masked by the surface soil.

A prospector reported that this same slate is cut at an elevation of several hundred feet above the lake by Boundary creek, a creek that flows into the Arm from the west almost exactly on the 60th paralel. This contact, when traced out, should prove a profitable field for prospecting, and is worthy of serious investigation.

On the east side of the Arm the mountains are even more precipitous than on the west, and seem to consist for the most part of the same class of igneous rocks seen on the west side of the Arm.

In the vicinity of the British Columbia boundary, about a mile to the east of Windy Arm, a mass of limestone was noted on the mountain side, and, from float seen near by, it is probable that a band of slate will also be found on this side of the Arm, although its location has not been fixed. The contact of these sedimentaries with the igneous rocks, so prominent in the district, must be looked upon as likely to contain mineral, and is a section well worthy the attention of the prospector.

On the west side of Windy Arm, just south of the British Columbia - Yukon boundary, a town site has been laid out on a gravelly point formed in the Arm by Boundary creek. Should the railway branch be built in from Log Cabin, it would pass through or near the town site.

Notes on Inyo County, Cal.*

BY H. H. TAFT.†

Borax Deposits.—South of the Funeral range, in the region drained by Furnace creek and on the Amargosa side of the mountain, is a large development of recent sedimentaries—shales, clays, sandstones, and thin sheets of gypsum. There are a few intrusions of later andesite, and a heavy flow of black and brown basaltic lava. In these sedimentaries immense deposits of calcium borate occur, conformable with the strata. The most common mineral is colemanite. As one might expect from an element possessing the peculiar solubilities of borax, there are many combinations of boric acid, lime and soda under various mineralogical names. There is some question as to the origin of the deposits. The Pacific Coast Borax Co. first obtained title under the placer-law, but now favors lode-locations. That company has the region pretty well "corralled" for borax. The rocks are highly colored. The country is bare of vegetation, and water is scarce.

The borax-deposits are remarkable in size and purity. In one place there is an outcrop of calcium borate 30 ft. thick. At the Lila C. mine on the Amargosa side of the range, 35 miles from and in sight of Ash Meadows, is a deposit, from 3 to 17 ft. thick, dipping about 45° E., and explored on the surface for a mile. The underground workings are in the vein(?) for a quarter of a mile. This is the property that will bring a railroad to this section.

Death Valley.—Much has been written about this valley, and a strange amount of romance is attached to it. The prospector could easily find a more promising field and a less expensive place to work in. It is a long narrow valley, very deep and surrounded by high mountains. The Panamint and Sentinel peaks reach an extreme elevation of 11,000 ft., while Death valley, hardly 10 miles west, is two or three hundred feet below sea-level. A similar difference of elevation occurs 80 miles NW., between the summit of Mount Whitney and Owens Lake valley.

Under one general name there are three connecting valleys: Death valley proper, Lost valley and Mesquite valley. The upper end of the latter is only about 30 miles from Goldfield. Instead of being the horrible region usually reported, it is the best of the desert valleys. Lying so low and being shut in by surrounding mountains, it is hot in summer; but the winter climate leaves little to be desired, particularly by those who require a dry atmosphere. It is but a few miles west to an elevation in the Panamints, where in the shade of the pines the traveler can be comfortable, and look into the sweltering valley below, while a battery of abandoned charcoal-kilns might make him fancy he was summering near Lake Superior.

The name Death valley comes from the loss of an emigrant train in the lower end of Lost valley. The party was on the way from Salt Lake to southern California, and, becoming exhausted, stopped to rest in what appeared to be a meadow. The salt and wiry grass is not nutritious; the water is saline and carries enough sulphates to disarrange promptly the human digestive system. The spot, where it is said about 50 people perished, has been dug over for buried treasure; and last winter many of the pits were in blackish water. Some prospectors, also, have lost their lives in the south end of the valley.

At the mouth of Furnace creek the Pacific Coast Borax Co. maintains a ranch, having 200 acres in alfalfa and wheat. Twice a month a 16-mule team arrives from Dagget, 160 miles away on the Santa Fé Railroad. Three miles from the ranch are the old Coleman borax-works.

Furnace creek and several streams south, usually dry, bring down borax in solution. For a few miles in width and a length of about 30 miles, the lower part of this valley looks like a mud-flat with the tide out. These places are locally called marshes, although they have no vegetation. The borax is here a double borate of lime and soda, commonly called "cottonball."

A peculiar phenomenon, better seen in this than in the other valleys, is the "self-rising ground." The soil carries a large proportion of soluble salts, sodium carbonate, sodium chloride, and various sulphates and borates. Evaporation is excessive; the subsoil is moist, being constantly supplied by springs; and capillary attraction brings the salts to the surface. This does not go on evenly, but forms hummocks, sometimes 2 or 3 ft. high on the surface and soft beneath, making a bad and sometimes dangerous ground to walk across. The same natural laws have caused the surface-enrichment of some mineral-veins in the desert, particularly veins of copper-ore.

The atmosphere in the valley is remarkably clear and possesses the resonance so noticeable above the timber-line. There is no truth in the story about birds and animals dying in attempting to cross the valley. The Indians and the Borax company keep several hundred head of cattle and some mules and horses about the mouth of Furnace creek; and rabbits, quail and other small game can be found.

Panamint Range.—This range is unusually high and precipitous, starting at sea level instead of several thousand feet above, as most other high ranges do, and having no foot-hills. The rocks are green slates, mica schist, quartzite and limestone. On the west side is an intrusive granite which has tilted the whole formation, the larger part of it to the east. The green slates carry fine-looking quartz; but so far it has not been found to carry values. On top of the range are large areas of recent conglomerate and basaltic lava.

Panamint City once had 6,000 people and is now reduced to a few old-timers, who say it will soon start again and make "the greatest camp on earth." The ores are of silver—refractory and heavy, with a pyritic gangue. The railroad is 90 miles away.

On the west side of the mountain, every gulch for 46 miles has some sort of a mining equipment, usually a small stamp-mill, idle and owned by some Los Angeles company. The first question asked of strangers is "Are you from Los Angeles?" It is best to answer, "No!"

* From advance proofs (subject to revision) of the *Transactions* of the American Institute of Mining Engineers.

† Mining engineer, Denver, Colo.

Lead Mines.—South of the Amargosa there are some lead-ores and two large deposits of iron-ore. They are too far from a railroad to have anything but speculative value.

The mountains between the Panamints and the Sierra Nevada were once the scene of great activity in lead-silver mining. Old roads constructed at great expense, smelting-plants at the mines, and charcoal-kilns many miles away in the timbered mountains, are mute evidences of this former scene of activity.

Cerro Gordo, Darwin and Modock produced between 1870 and 1880 approximately $25,000,000. The first-named was the heaviest producer, furnishing the largest quantity and lowest grade of ore, while the last produced the smallest tonnage and the highest grade. They are all at or near the contact of granite and limestone. Unlike the deposits at Monarch, Colo., along a similar contact, these orebodies are from a few feet to 300 ft. away from the contact, in cracks and crevices of the limestone.

At Darwin there is an anticlinal about 6 miles long, the west side of which dips about 45° and the east side more steeply. The latter carries some copper, while the former shows none. The oxidized surface ores contain roughly 1 oz. of silver to 1 per cent. of lead, and the galena ores 2 oz. of silver to 1 per cent. of lead. From the old books left at some of the works, it would appear that the average ore contained from 40 to 60 per cent. of lead. The gangue is iron and lime, with some silica. There are four smelting-plants near this place, one of which is in good condition; and 20 persons are still living in the town.

The tradition of the country is that the ores became too poor to work at a depth of 800 feet. While these mines were working, Mojave, Cal., was the nearest railroad point, and wood and charcoal had to be hauled long distances. From the charcoal-kilns in the Panamints to Darwin is 50 miles. The altitude of the kilns is 8,000, that of Darwin 6,000, and that of the intervening Panamint valley 1,100 ft. above tide. The price of fodder must have been high. The nearest farms are now 50 miles away.

Cerro Gordo is 7 miles from, and 3,500 ft. above, Keeler, the terminus of the Carson & Colorado railroad, 334 miles from Reno and, by wagon-road, 120 miles from Mojave. Here are located the soda-works of the Inyo County Development Co. With diminished treatment charges at custom-smelters, lower rates of freight, and the flood of siliceous ores now going on to the market, it would not be surprising if these lead-ores, with their useful fluxing character, should be again mined with profit.

Owens Lake Valley.—Owens Lake valley, about 75 miles long and 20 wide, is drained by Owens river which flows into the lake of the same name, about 18 by 12 miles in area. The water of the lake is a nearly saturated solution of sodium carbonate and common salt, with a little sulphates and borax. There is no verdure around the edges.

The river is fed by streams from the west, having their origin in the Sierra Nevada, a very high, snowy and well-timbered range. All the older settlements are on these streams, but the railroad follows the east side of the valley. A large ditch has been carried by an irrigation company down the east side of the valley to within 12 miles of Keeler; and the new comers are settling along this ditch.

While the valley is fertile and well-watered, particularly at the north end, farmers have not as a rule been prosperous, because the market was too distant. Now a sudden change has come. From Laws station, opposite Bishop, in the upper end of the valley, to Tonopah is 113 miles by rail. It is fortunate, both for the farmers and the miners, that there should be an agricultural region so near.

All the streams coming from the Sierra Nevada furnish opportunities for developing water-power; already a company is preparing to generate and transmit electric power from Bishop creek to Tonopah and Goldfield.

All the grains and fruits of the temperate zone are raised here. The apples, peaches, pears and certain varieties of grapes, are better than those raised on the Coast-side of the Sierra.

Smaller Mines Tributary to Owens Lake Valley.—In the south end of the Argus range and in the Coso mountains are many veins, usually only a few feet in width, of white quartz in granite, occasionally carrying gold, low in value and in spots rather than in regular ore-bodies. Most mining men dislike these conditions. The Congress mine in Arizona is the only large and successful enterprise working this class of quartz.

The Beveridge and Lee districts, NW. of Darwin, have argentiferous ores. At the latter place there was formerly a stamp-mill, which, judging from the amount of tailings, did not run long.

The Ubaheba district, lying between the Saline and Butte valleys, is a large undeveloped region of low-grade copper-ores, in contact-deposits between limestone and some acid eruptive. These valleys are very deep, and would be a continuation of the Panamint valley but for an east and west mountain that looks like an enormous dam. The west end is granite; but the larger portion of the mountain is recent conglomerate overflowed by basalt.

In the mountains facing Owens Lake valley on the east side, both in the granite and the chloritic slates, quartzites and limestones, which the intrusive has thrown on edge, there are numerous veins of white quartz, carrying occasional gold-values.

Between the stations of Alvord and Citrus, 3 or 4 miles from the railroad at the foot of the mountain, and well located for economic reasons, is a new stamp-mill and out-buildings, now idle. Farther up the valley, at Poleta, there is a plant running.

Between Owens Valley and Goldfield.—From Alvord station, 5 miles from Big Pine, 20 miles from Bishop, and 54 miles by rail from Keeler, there is a wagon-road, 61 miles to Lida, and 96 miles to Goldfield. This road is now much used by freighters and farmers hauling produce to Lida, Goldfield and Tonopah. Three ranges of mountains and two valleys are crossed. Between the Deep Spring and Fish Lake valleys there is a gold-copper exploration near the road. In the mountain east of Fish lake are two old mills.

About Lida, and between Lida and Montezuma mountain, the formation is light-green slates overlain nonconformably by limestone. In the slates are dikes of porphyry and rhyolite, and many quartz-veins. At Lida the veins are exposed on the surface and show remarkable persistence in length; but when worked 30 years ago, they were found to lose their values at a depth of from 200 to 300 feet. The ore is quartz with little galena and zinc blende. The principal values are in silver.

From Lida east to the Kawich range the rocks are all volcanic, from rhyolite to basalt inclusive, but rarely are there any of the earlier tuffs or andesites.

Gold Center is a small area, similar to Goldfield, but the ores are not particularly high-grade or continuous. The soft aluminous country-rock seems to have moved too much after the ore was deposited.

Quartz Mountain, 24 miles south, is of rhyolite, with veins similar to those of the Bullfrog district.

It is remarkable that so many mines have been found of late years in the volcanic tuffs, now generally known as andesite. A very large portion of them carry gold. One cannot but wonder if there are not more. This is not a formation which prospectors have liked until lately; and as yet it has been but imperfectly studied. The fact that the mineral-bearing tuffs are basic, and are overlain by the acid rhyolite, is perhaps significant. Cripple Creek has a rhyolite mountain in which much money has been spent without satisfactory results. The nature of the veins, too, is new. They may often be called freaks. Mineralizations of country-rock are to be expected rather than "text-book" veins, such as used to be sought for.

Andre Marie Ampére, the discoverer of electro magnetism, whose name has been given to the electrical unit signifying the rate of flow, was born at Lyons, France, January 22, 1775.

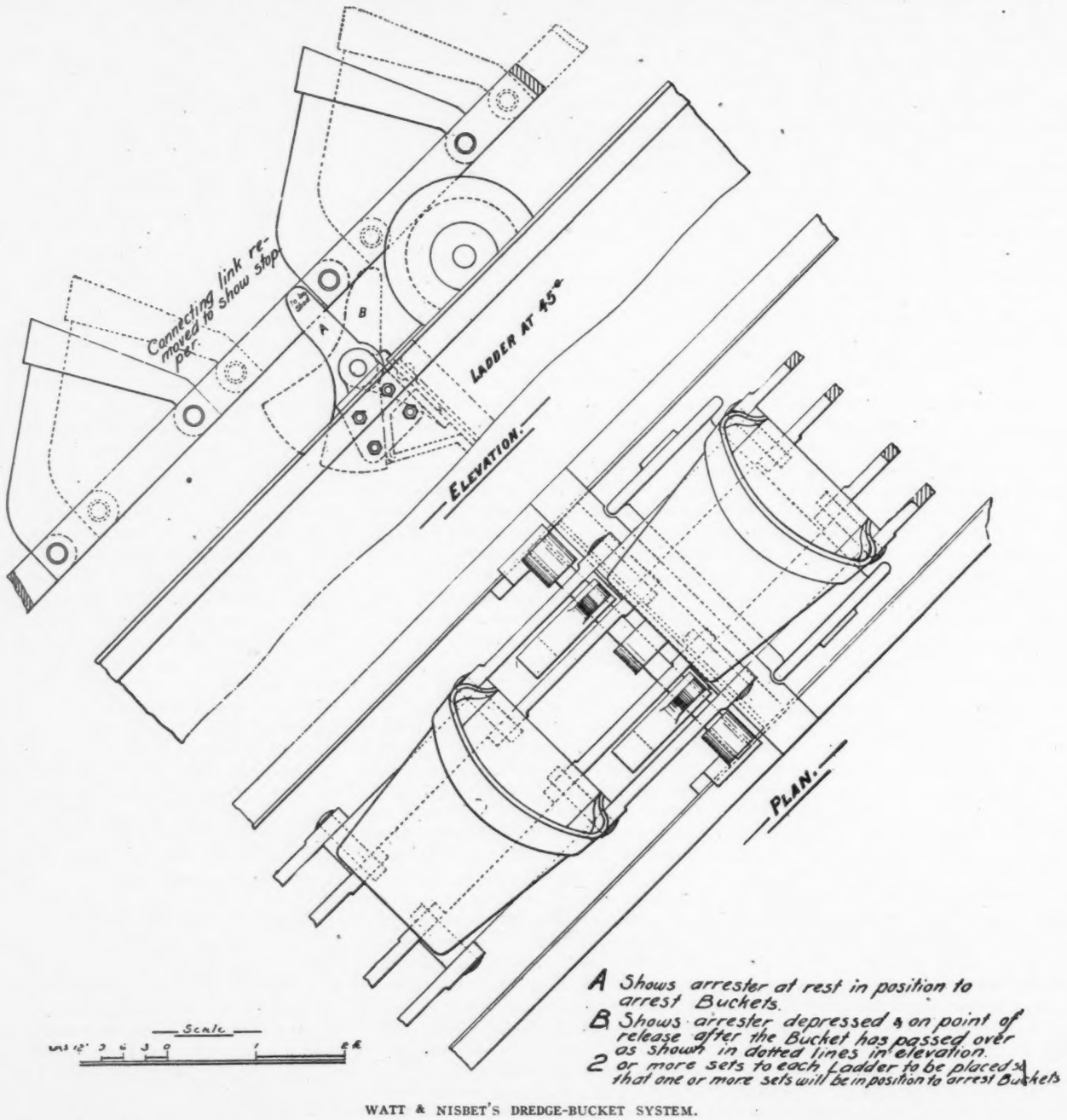
New Zealand Gold Dredges.*

Whatt & Nisbet's Stopper for Prevention of Loss of Buckets.—This is a simple contrivance set upon the bucket-ladder of a dredge, placed at right angles with the ladder, and consists of a shaft working in three bearings. On the shaft are secured two "bell-crank" levers, having a light and a heavy end. These crank levers are so placed on the shaft as to come exactly between the connecting-links, and in a line with the center of the bucket-link. The light end of the bell-crank being uppermost and working against the under-side of the bucket-link, the lower or heavy end of the bell-crank is made sufficiently heavy to bring it to a position of rest as shown in full lines on plan. When in this position it will arrest the runaway buckets before they have traveled more than 8 in. or 10 in. The dotted lines show the chain of buckets having traveled a distance of 8 in., and it will be seen that the bell-crank has assumed a horizontal position, and is on the point of release from the bucket-links. There should not be less than two sets placed on each ladder, so that one set will always be in position to arrest the runaway buckets.

The arresters are placed in the center of the ladder and at or near the lower end; the center ladder-roller must be a flanged one, so as to guide the bucket-chain centrally.

By reference to the plan it will be easily seen that the tumblers shown in full lines are at rest, while the dotted lines indicate the tumblers on the point of release. A set further up the ladder would be at the point of release at the end of the bucket-link, and set lower down would just be coming into contact with the front end of the bucket-link. By this means there is always one in position to arrest the buckets; and should the chain break, one or more will immediately fly into position.

There are disengaging-levers not shown on the plan, intended to disengage any one or all of the tumblers. They are placed within easy reach of the winchman.


Connecting link removed to show stop per.
A
B
LADDER AT 45°
ELEVATION.
PLAN.
Scale
A Shows arrester at rest in position to arrest Buckets.
B Shows arrester depressed & on point of release after the Bucket has passed over as shown in dotted lines in elevation.
2 or more sets to each Ladder to be placed so that one or more sets will be in position to arrest Buckets

WATT & NISBET'S DREDGE-BUCKET SYSTEM.

* From "Papers Relating to Minerals and Mining," Wellington, New Zealand, 1905 (Government Report), p. 17.

Gillespie's Dredging-link Shoe.—Thomas Gillespie, dredgemaster of the Happy Valley dredge, Happy Valley, Lawrence, Otago, has patented a simple arrangement by which the working-life of an ordinary dredge-bucket "runner" can be prolonged, and at the same time effect considerable diminution in the ordinary costs of repairs.

Hitherto, the bucket runners have been subjected to enormous friction, and when somewhat worn down have been reversed until worn down at the other side to such an extent as to become useless. By the adoption of the improvement under notice, the runner itself is relieved from wear by a shoe of ⅝-in. angle steel, secured to the runner by a couple of rivets, which are easily removable when it is necessary to remove the old shoe and substitute a new one. In the case of old buckets which have been at work in the ordinary way, shoes of angle steel can be fitted to cover the worn part of the runner, which thus becomes virtually equal to new.

It is claimed that the cost of fitting a set of buckets with these shoes is not a quarter of the cost of replacing a full set of runners, and also that the loss of time in fitting or renewing the shoes is trifling compared with that of entirely renewing a set of runners, thus effecting a double saving. The invention has been adopted on some of the dredges in the locality, and has given entire satisfaction.

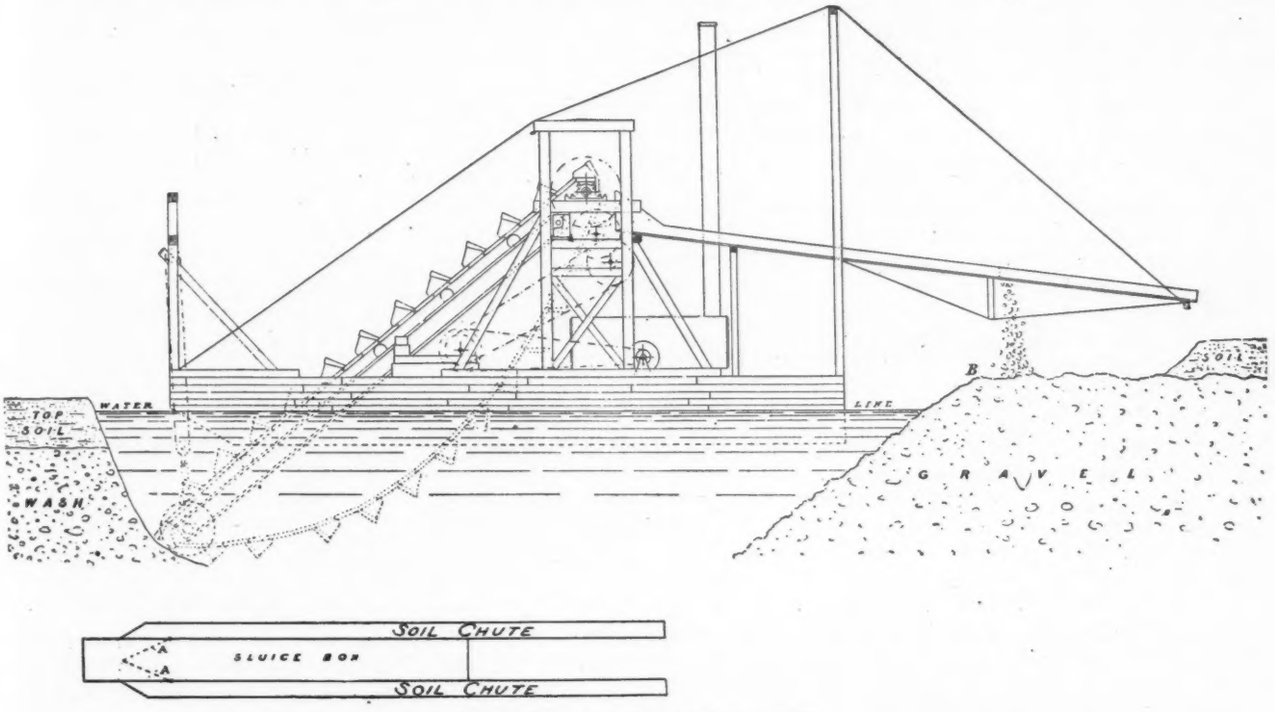
Restoration of Land after being worked by Gold-dredges.—F. W. Payne, consulting engineer, Dunedin, has supplied a drawing and description of a dredge "Knewstubbs' system" so designed as to strip off the surface soil, etc., overlying the gravel wash in advance of the dredging-work proper and to deposit the soil on the tailings well behind the dredge.

The replacement of the top soil or overburden on the gravel is carried out by a simple arrangement of combined sluice-box and soil-shoots, as shown in plan. The two outside shoots carry the soil, and these, being longer than the sluice-box, convey the soil to a much greater distance than the tailings, and naturally deposit the soil on the top of the latter. In working the dredge, operations are conducted alternately in the soil and the gravel, the work of stripping being carried on without lifting the auriferous gravel. The drawing shows the dredge in a position ready for receiving the buckets to strip the top soil to a depth just sufficient to allow flotation of the pontoons. Stripping is carried on across the whole width of the paddock-face and as far forward as the buckets can conveniently work, the soil being carried over and deposited on the gravel-tailings by means of the soil-shoots until the point B is reached. The dredge is then dropped back and the gravel-wash dredged separately.

When the top soil is being worked the doors *AA* shown by dotted lines close the sluice-box, and divert the material to each of the side shoots. When the dredge is put to work on the gravel these doors are moved so as to close off the side shoots and open the sluice-box. The side or soil shoots are preferably lined with flat plates, and, when the gravel is being treated, serve as platforms for the man attending to the sluice-box.

It is recognized that, in addition to the great advantage of replacing the soil on the tailings, the treatment of the wash by itself—instead of being intermixed with soil and clay, as is usual—is materially conducive to the saving of gold now lost by the ordinary methods.

The Blackwater River Gold-dredging company has adopted a novel method of giving the gravel a shaking in its passage down the screen. Instead of the periphery of the screen being truly circular, as is usual, there are four "set-offs" of 4 in. each at regular intervals, the design being to give the gravels four drops of 4 in. each in every revolution, and thus prevent the material which is being screened from sliding down the screen in lumps. The effect would naturally be to assist in the disintegration of gravels which might be held together by any cementing-material.



RESTORATION OF AGRICULTURAL LANDS.

Cast iron is practically ruled out in modern structural specifications, as it is the poorest of all metals used for structural purposes to resist bending and tension. It has been the cause of several disasters, and, in bridge work, has been entirely abandoned for many years. The use of cast iron in columns with the usual beam connections is to be particularly condemned, as the beams are supported by lugs or brackets cast on the columns, thus producing eccentric loading and bending strains.

When more than one rolled beam is used to form a girder, they should be connected by bolts and separators at intervals of not more than 5 ft. These may be the ordinary cast iron separator, or, for some cases, gas pipe may be used to advantage.

The Quincy Mine Assay Office—II.*

BY C. W. MACDOUGALL.†

CONCENTRATES.

When the can containing the samples of the No. 2 hydraulic, or No. 2 Wilfley, is received at the assay office, the entire contents of the can are placed on a large "pie tin," (8 in. in diameter and 1¼ in. deep) and dried. This takes from three to five hours on a radiator. When the sample is thoroughly dry it is returned to the can in which it was received, and put to one side. When all the samples for a run have been received and dried, they are sampled in the dry sampler, shown in Fig. 2.

The dry sample is poured into the glass funnel forming the hopper and held there by a gate similar in construction to the smoke damper of a stove. The triangular sampler is then placed in position, the gate opened, and the sampler is made to pass back and forth through the falling stream of mineral, taking a complete cross-section at each stroke. The remaining part of the sample falls directly into a drawer placed in the bottom of the sampler. After the sample has been taken it is removed from the triangular sampler and placed on a tin ready to be weighed. The portion falling into the drawer is returned to the sample can.

TABLE 1, WEEKLY MINERAL REPORT.

Date. July.	Mill No. 1. Weight of No. 2 Hydraulic.	Mill No. 1. Weight of No. 2 Wilfley.	Mill No. 1. Weight of No. 3 Mineral.	Mill No. 2. Weight of No. 2 Hydraulic.	Mill No. 2. Weight of No. 2 Wilfley.	Mill No. 2. Weight of No. 3 Mineral.
10	..... lb.	..... lb.	..... lb.	..... lb.	..... lb.	..... lb.
11	..... b.	..... lb.	..... lb.	.... lb.	..... lb.	..... lb.
12	..... lb.	..... lb.	..... lb.	..... lb.	..... lb.	..... lb.
13	..... lb.	..... lb.	..... lb.	..... lb.	..... lb.	..... lb.
14	..... lb.	..... lb.	..... lb.	..... lb.	..... lb.	..... lb.
15	..... lb.	..... lb.	..... lb.	..... lb.	..... lb.	..... lb.

The No. 3 mineral is sampled wet, in the same manner as the waste sand. It is then dried, and weighed in the same manner as the No. 2 mineral.

Combining the Concentrate Samples.—Every Monday morning there is received at the assay office a weekly mineral report showing the weight of the No. 2 and No. 3 mineral from which each individual sample has been taken; a copy of this report is given in Table 1. ‡

A direct proportion of the weight in pounds of each shipment of a particular grade is taken and combined with a similar proportion from each shipment of that grade for that particular run. After weighing the required number of grams from each sample for that grade, the combined sample is placed in a bottle ready for assay. By this method of combination, the percentage of copper represents accurately the quantity of copper in the mineral from which the samples have been obtained. This method of combination is used for all three grades of concentrates received.

FIRE ASSAY.

The No. 2 hydraulic and No. 2 Wilfley are assayed by the fire method in the following manner: The sample representing a particular grade, and from either mill, is placed on a piece of oil cloth and thoroughly mixed by rolling. Three samples, of 50 grams each, are taken for assay. When all the samples to be assayed have been weighed, 30 grams of the following flux is added to each sample: cream of tartar (c. p.) 120 grams; fused soda, 80 grams; borax glass, 75 grams.

The 30 grams of flux and 50 grams of sample are then mixed and placed in a No. 5 Hessian sand crucible. The mixture is then covered with 10 grams of crucible slag from previous assays. Twelve samples in all are assayed each week by this method. There are three of each of the following: No. 2, Hydraulic mill No. 1; No. 2, Wilfley mill No. 1; No. 2, Hydraulic mill No. 2; No. 2, Wilfley mill No. 2; total 12.

Fire Manipulation.—After the furnace has been thoroughly heated which takes about three hours, four crucibles are placed in the furnace on fire brick crossbars and covered with sand-cruicble covers. Soft coal is then placed carefully around each crucible, piece by piece, so that the crucibles will not upset.

After the coal has been introduced the time is noted; five minutes later the draught is opened by poking the fire to break any coke crust that may have formed. At the end of eight minutes more, coal is added. When 13 minutes have elapsed, poke the fire once more; and at the end of 17 minutes, remove the crucible if the reaction is complete. This may be determined by removing the cover of a crucible while it is still in the fire and noting the appearance of the surface of the charge. If the reaction is complete, there will be rings forming at the center of the surface of the slag and gradually moving outward to the sides of the crucible. If the reaction is not complete, small bubbles of gas will be given off from the slag giving it the appearance of boiling. Since the furnace cools considerably while removing the crucibles, sufficient time is given between charges for the furnace to reach the proper temperature before putting in the next charge.

After the crucibles and contents have become thoroughly cold, the crucibles are broken open and the copper button is removed, care being taken to save some of the crucible slag which is used as a cover for the charge in subsequent assays. The button is then pounded with a steel hammer, weighing about 1½ lb. until all the adhering slag has been removed. It is then weighed and the percentage of copper calculated, thus: Weight of sample taken (50 grams): 100=weight of button: per cent. copper: or (weight of button) × 2 =per cent. copper.

TABLE 4.

May 1905. Mill No. 1. Date of Sample	Wet Wt. of Mineral.	Weight Taken in Combination	Weight of Button.	% Cu.
1	6,510 lb.	65 grams	.... grams	....
2	5,560 lb.	56 "	.... "	....
3	14,400 lb.	144 "	.... "	....
4	6,190 lb.	62 "		
5	12,055 lb.	121 "	Av.	....
6	5,805 lb.	58 "		
Wet	50,520 lb.			
Dry 48,393 lb. @ .... % Cu. = ... lb. Ref. Cu.				
8	5,925 lb.	59 grams	.... grams	....
9	19,475 lb.	195 "	.... "	....
10	6,870 lb.	69 "	.... "	....
11	7,455 lb.	75 "		
12	8,140 lb.	81 "	Av.	....
13	18,290 lb.	183 "		
Wet	66,155 lb.			
Dry 63,332 lb. @ ... % Cu. = ... lb. Ref. Cu.				
15	6,865 lb.	69 grams	.... grams	....
16	7,660 lb.	77 "	.... "	....
17	6,890 lb.	69 "	.... "	....
18	6,640 lb.	66 "		
19	7,970 lb.	80 "	Av.	....
20	12,620 lb.	126 "		
Wet	48,645 lb.			
Dry 46,597 lb. @ .... % Cu. = ... lb. Ref. Cu.				

No. 2 Hydraulic.

Date of Sample	Wet Wt. of Mineral.	Weight Taken in Combination	Weight of Button.	% Cu.
22	14,925 lb.	149 grams	.... grams	....
23	6,425 lb.	64 "	.... "	....
24	7,790 lb.	78 "	.... "	....
25	7,930 lb.	79 "		
26	5,810 lb.	58 "	Av.	....
27	19,015 lb.	190 "		
29	8,230 lb.	82 "		
30	7,760 lb.	78 "		
31	7,610 lb.	76 "		
Wet	85,495 lb.			
Dry 81,894 lb. @ .... % Cu. = ... lb. Ref. Cu.				

Total wet wt. = 250,815 lb. Moisture = ... %.
Total dry wt. = 240,216 lb.
Ref. Cu. = ... lb.
% Cu. wet wt. = ... %.
% Cu. dry wt. = ... %.

ANALYSIS OF NO. 3 MINERAL.

The combined sample of No. 3 mineral is ground in an iron mortar until it will all pass through a 60-mesh sieve. It has been found, by experiments, that it

*Continued from the JOURNAL, April 7, 1906. Pp. 654-655.

†Assistant mining engineer, Quincy Mine Hancock, Mich.

‡ Tables 2 and 3 will be given with the next (concluding) instalment of this article.

is not necessary to reduce the size of the grains more than this as the nitric acid used is strong enough to remove all the copper included, in grains of this size.

The No. 3 mineral is assayed by the electrolytic method in the following manner: 50 grams of the sample is taken, placed in a No. 4 porcelain casserole, and covered with about 100 c.c. of distilled water. 100 c.c. of concentrated nitric acid is then added slowly (25 c.c. at a time); a watch glass covers the top of the casserole to prevent loss by spattering. When all action has ceased the solution is boiled until all the red fumes have been driven off. It is then cooled, the glass cover removed, and the adhering solution washed into the casserole. The solution is then filtered through a double 12.5-cm. Munktell filter into a 750-c.c flask, the speed of filtering being increased by means of a filter-pump. After the copper liquor is filtered, the residue (consisting of insoluble gangue) is thoroughly washed until the wash water shows no copper by the ammonia test. The content of the flask is then poured into a graduated 1-liter flask, and water added until the solution has a volume of 1000 c.c. This diluted solution is then poured into a No. 6 Griffen beaker and thoroughly stirred. 10 c.c. of the solution is then removed with a pipette and put in a No. 2 beaker; about 75 c.c. of water is then added, and to this solution 5 c.c. of concentrated sulphuric acid is added. Finally the bulk of the solution is brought to about 200 c.c. and the solution is electrolyzed. When the electrolysis is complete, the cone is washed and weighed in the usual manner.

After the amount of copper deposited has been determined, the percentage of copper is calculated as follows: Since 10 c.c. (of a solution of 1000 c.c. containing the dissolved copper from 50 grams) was taken,

$50 \times \frac{10}{1000} : 100 =$ weight of copper obtained : per cent. copper; or $200 \times$ weight of copper obtained = per cent. copper.

Calculations for Determination of the Percentage of Copper in the Mineral at the End of the Month. This method applies to all the grades of mineral assayed.

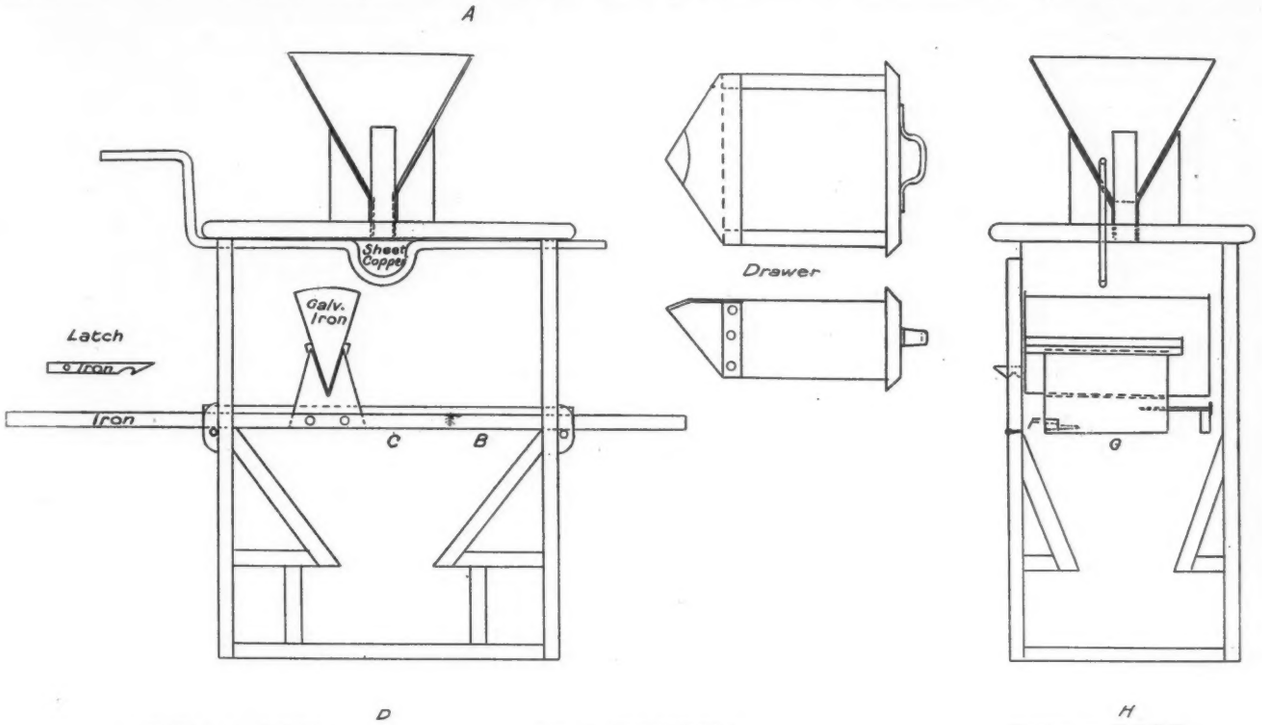
As the weights of mineral received from the mill are all *wet* weights, and as the percentages of copper for the various runs have been determined from the *dry* weight of mineral, the wet weight is reduced to a dry basis by multiplying the wet weight of the mineral by the percentage of moisture divided by 100. This product is then subtracted from the wet weight; the remainder will represent the dry weight. This calculated dry weight is multiplied by the percentage of copper, in that particular run, divided by 100. The product obtained from this operation represents the quantity of refined copper in that particular run (See Table 4).

After the refined copper has been calculated for the various runs made during the month on that particular grades, the total refined copper is found by addition; this sum is divided by the total weight of mineral from that particular source. The result of this division multiplied by 100, will represent the percentage of copper contained in the dry mineral of that particular grade and mill. In the same manner the percentage of copper is calculated to the wet basis by substituting the wet weight in the description as given. This process is repeated for each grade from each mill.

As there are two grades of No. 2 mineral from each mill, it is necessary to determine the percentage of copper in the total No. 2 mineral from each mill; the sum of the weights of refined copper from each of the grades from that mill is found. This sum is then divided by the total dry weight of No. 2 mineral from that mill. The quotient multiplied by 100 will represent accurately the average percentage of copper in the dry No. 2 mineral obtained from that mill. By using the total wet weights in the same manner the percentage of copper on a wet basis is obtained.

Finally to determine the percentage of copper in the No. 2 mineral from both mills, take the sum of the calculated refined copper from that grade from both mills and divide that sum by the total weight of No. 2 mineral shipped from both mills; the quotient multiplied by 100 represents the percentage of copper for either dry or wet weight, depending on which weight has been used as a divisor, in the entire output of No. 2 mineral from both mills. The same method is used in the case of the No. 3 mineral, but as there is only one grade from each mill the second operation is omitted.

(To be concluded).



Section on A-B-C-D. FIG. 2. DRY SAMPLER. Section on E-F-G-H.

The director of the Berlin Observatory says the Courrières disaster was connected with atmospheric conditions, and that the crust of the earth in the Eastern Hemisphere is in a dangerous condition. He predicts other disasters.

Mining Coal at Deaverton, Ohio.

An interesting electric coal mining equipment is found at the Tropic Mining Company's mine on the Zanesville & Western Railroad at Deaverton, Morgan county, Ohio. The operations are carried on in the No. 6 seam, which has an average thickness of 3ft. 8 in., the coal being of excellent quality; the average daily output of the mine is about 1400 tons, run-of-mine coal, in 8 hours. In order to reduce the cost of mining and decrease the percentage of "slack", nearly all the mining is done by chain machines.

An electric plant has been installed, which furnishes power to the mining machines, electric locomotives, and motors.

The power plant consists of two 100-kw. 250-volt, direct-current, belted generators, built by the Jeffrey Manufacturing Company, each generator being driven by a 16x16-in. McEwen engine. The switchboard is of the skeleton type and is equipped with necessary instruments and switches for controlling the machines. Steam is supplied by a battery of two 72-in. x 18-ft. Atlas boilers. In the power house is also installed a double reversible 10x12-in. hoisting engine with two 3-ft. 6-in. drums; this furnishes power for rope haulage for handling cars on the slope. The length of the rope haulage is about 1200 ft., the maximum grade is about 15 per cent. Twenty cars are hauled per trip, the empties being returned by gravity.

The entries are driven 16 ft. wide with an average hight of 4 ft. 6 in. The rooms are driven to a depth of 250 ft., and a width of 30 ft., the room necks being 12 ft. wide. Nine electric undercutting mining machines of the chain type are in use. Eight of these are of the Jeffrey class 17-A type, making an undercut of 6 ft. in depth and 44 in. in width. The average run per day of eight hours is 40, and the maximum for each machine is sixty runs. The machines are equipped with a self-propelling arrangement by which they can be moved from one point to another.

On account of the thin vein, only small mules or ponies can be used for gathering. The weight of the mules employed is between 500 and 600 lb., and the maximum hight about 52 in. The coal is gathered to four different partings by 14 mules, each with a driver, gathering an average of about 120 cars per day. This includes coal, slate and other material taken out of the mine. Each driver takes care of 14 rooms and at present the average length of mule haulage is 90 ft. To haul the mine cars from the partings to the bottom of the slope, a six-ton Jeffrey electric locomotive is employed. The locomotive averages about 60 trips per day of eight hours, and handles between 1200 and 1350 cars per day.

The average length of haul from the four partings is about 1200 ft., there being but very slight grades against the loads, the maximum being about 2 per cent. and this only for a short distance.

The locomotive roadbed is laid with 30-lb. steel rails, but in the rooms 16-lb. rails are used. The locomotive, when delivering the loaded cars to the bottom of the slope, has to make a flying switch for a side track, and as part of the track on which the loaded cars are delivered is on a grade, it is necessary for the locomotive to pass over the switch at full speed in order to give the loaded trip enough momentum to clear the switch at the side track. The trip rider uncouples the cars and the switch is thrown automatically by the locomotive as it passes. The locomotive handles from 18 to 30 cars per trip; the loaded cars weigh 3900 lb. each.

The tipple is designed for an output of 2000 tons of coal per day; it is equipped with an automatic Phillips crossover dump. The blacksmith shop is equipped with a 4-h.p. motor which furnishes power to drive the forge-blowers and other tools.

Trinidad Manjak.

In addition to the asphalt resources of Pitch lake and its contiguous land, for which the island of Trinidad is chiefly famous, deposits of "manjak," the name given locally to a variety of glance pitch or grahamite, are now being developed on a scale corresponding to the growing demand for the substance. Other supplies of similar material are found in Utah and Indian Territory in the United States, in the Barbadoes and at the Talaren mine in Cuba. The Trinidad manjak deposits were discovered several years ago on the abandoned Vistabella sugar plantation, one mile from the town of San Fernando, and 12 miles from Pitch lake, with which they have no apparent connection. The Vistabella estate, covering 360 acres, lies on the west seacoast just south of the Tarouba river, and is traversed by the Government railway. The deposits were worked by a private syndicate until July, 1905, when the Trinidad Vistabella Manjak Company, Ltd., Port-of-Spain, Trinidad, was organized, to which we are indebted for the following details.

Thus far, of the several deposits on the estate, only one has been productive, and this has supplied the entire demand. Its total output has now reached 6000 long tons; the yield in 1904 was 3000 tons, but a serious accident early in 1905, in which 17 lives were lost, restricted the output of that year. More recently, an output of 500 tons per month has been sustained for several months. It is anticipated that the demand will continue to grow, as the possibility of maintaining a steady production becomes assured. A large firm in London has already signified some desire to contract for the entire output.

The manjak occurs in a steeply pitching seam, which widens with depth. A vertical shaft has been sunk to cut the seam, and crosscuts have been driven on five levels to intersect it. On the first level, 55 ft. below surface, the seam is 10 ft. wide, and on the fifth, at a depth of 200 ft., it is 33 ft. wide. Down to the fourth level, at a depth of 150 ft., the manjak retained a dull coaly character; on the fifth level, the seam was found to have a core of bright, unaltered material with the shiny gloss of patent leather.

Of the following three analyses of Vistabella manjak, the first two are by Boverton Redwood, and their percentages are based on the dried material; the third is by P. Carmody, and is based on the original sample:

	I.	II.	III.
Water	4.2	4.4	4.0
Petrolene	17.5	20.3	16.8
Asphaltene	71.2	66.9	72.0
Total bitumen	88.7	87.2	88.8
Non-bituminous organic matter	5.0	6.5	0.4
Mineral matter	6.3	6.3	4.2
Sulphur	2.97	3.06	2.6
At red heat:			
Coke	35.7	36.7	30.65
Volatile	58.0	56.9	65.15
Specific gravity	1.139	1.147	1.13
Softening point		300° F.	383° F.
Melting point		360° F.	464° F.

Another analysis by the New York Testing Laboratory shows 94.2 per cent. of bitumen soluble in carbon bisulphide, and three more by A. Urich, show soluble bitumen ranging from 95 to 97.6 per cent.

The Trinidad manjak is used mainly for electric insulation, being superior for this purpose to vulcanized rubber, owing to its smaller proportion of sulphur. The finer grades, particularly if their melting points are low, are valuable as a basis varnish. The dull manjak found in the upper levels of the mine has a rather high melting point, but recent experiments, thus far on a small scale only, have indicated a method of treatment whereby the melting point may be adjusted to suit the requirements of any trade.

Alaska's Gold Production.

John G. Brady, of Alaska, has recently presented his annual report to the Government, covering 1905. In this he estimates the gold yield at about $12,000,000. the chief contributing districts being as follows: Fairbank, $6,000,000; Nome, $4,000,000; Circle, $1,000,000; other fields, $1,000,000. The report states that new discoveries and locations have been made in the country between Ketchikan and Juneau, the latest discovery being on the west side of Chichagoff island, about 60 miles north of Sitka. A considerable amount of gold has been obtained at Yakataka, about 65 miles east of Kayak. The whole area south of the Yukon and north of the sea seems to be gold producing, a great part being unexplored.

The Crow's Nest Coalfield, British Columbia.*

BY JAMES ASHWORTH.

Crow's Nest Coalfield.—The Crow's Nest coalfield is situated immediately west of the summit of the Rocky Mountains, about 370 miles from the Pacific coast, and practically the whole of it lies in British Columbia. The coalfield is of Cretaceous age, and the rocks of this section cover an area of about 500 square miles; but the coalfield has an area of only about 230 miles and is of leg-of-mutton shape, with a length from north to south of about 35 miles, and a width from east to west varying from 4 to about 11 miles. It is bounded on the west by the Elk river, which runs parallel to the upturned edges of the measures, and the outcrops of the coal are found commencing at an elevation of from 1,500 to 2,000 ft. above the river, with a dip to the eastward of from 20 to 40°. The coalfield is in the shape of a flat-bottomed basin, and the coal therefore crops out with its upturned edges to the north, south, east and west.

The coalfield is based on the Devono-Carboniferous limestone, and in ascending order, from this base, there are beds of dark shale and soft calcareous shales, known as the "Fernie shales," which have been much crushed and folded. The coal seams above have not, however, been affected to the same extent, particularly on the west and south sides, and it has been assumed that the very hard beds of conglomerate (consisting of black and gray chert, embedded in a silicified matrix) and gritty sandstone (shown at the top of the section of the Morrissey coalfield, made by James McEvoy),[1] have resisted the eroding, crushing and folding forces that are in evidence elsewhere.

The total thickness of the Cretaceous rocks in this coalfield has been estimated at from 12,000 to 13,000 ft. and in the section before referred to there is a thickness of about 198 ft. of workable coal in a depth of 1,847 ft. of strata. Seams of 3 ft. and under are omitted from the calculation.

Only a very few years ago, the Crow's Nest coalfield was a *terra incognita*, and the first reference made to it was in the report of the Geological Survey of Canada, 1880-82. Subsequently to this and for some eight years it was persistently prospected by William Fernie (after whom the town of Fernie is named), and during this period (1889-97) a syndicate was formed to develop what Dr. Dawson called "one of the most remarkable coal-basins known." In the latter year, an arrangement was made with the Canadian Pacific Railway Company for the construction of the Crow's Nest Railway from Dunmore to Kootenay lake, a distance of 394 miles. The Crow's Nest Pass Coal Company, Ltd., was incorporated by Dominion charter in 1897, and now owns 250,000 acres of land. This company has opened mines at Michel at the northern end, at Carbonado (Morrissey) at the southern end, and at Coal creek (Fernie) in the center of the western side. The Canadian Pacific Railway Company and other companies own coal-lands in this area, but nothing more than exploratory work has been done up to the present time. The railway track reached Fernie in 1898, and the output of coal has been increasing year by year, until it is now equal to about 5,000 tons per day; and the coke production amounts to about 1,500 tons per day.

Samples of the seams of coal collected by the inspectors of mines gave the following percentage analysis: Moisture, 0.91; volatile combustible matter, 19.01; fixed carbon, 69.93; ash, 9.83; and sulphur, 0.32. The coke made from these coals is long, lustrous and strong, and is shipped to the smelters in Canada and the United States, *via* the Canadian Pacific and Great Northern railways.

At Coal Creek and Carbonado the valleys are so narrow, where the mines are opened out, that the coke-ovens (beehive) are placed at some distance from the mines; but at Michel they are close to the works.

A peculiar legislative restriction is placed on the Crow's Nest Pass Coal Company, by which it is prevented from charging more than 8s. 4d. ($2) per ton for run-of-mine coal at the mines. Most of the coal seams are soft, and produce a large proportion of small slack.

The seams of coal, now being developed in several places, have not been absolutely correlated, but J. McEvoy places No. 61, 63 and 71, in his Morrissey section, as being the same as the three seams of coal at Coal Creek, which are respectively 10 ft., 30 ft. and 6 ft. thick. No. 61 seam will therefore correspond with the Fernie mine (Coal Creek, No. 2), in which the explosion occurred in 1902; and with No. 1 mine, Carbonado, where the huge outbursts of gas occurred.[2] Although the thicknesses of the coal seams are much the same at both places, the intervening strata have thinned to the north, thus, 140 ft. and 197 ft., or a total of 337 ft., become 60 ft. and 42 ft., or a total of 102 ft., showing a reduction of 235 ft. It would seem that this thinning process is continuous in a northerly direction, and in the Frank-Blairmore coalfields (adjoining the Crow's Nest coalfield on the north, and divided from it by the main range of the Rocky Mountains) the productive thickness of the Lower Cretaceous measures is placed by W. W. Leach at 740 ft., with 125 ft. of coal, thus showing a great thinning of both coal and shale.

Frank-Blairmore Coalfield.—The Crow's Nest and Frank-Blairmore coalfields are practically one coalfield separated by great upheavals, foldings and crushing of the strata.

From the "Loop," say, 3 miles east of Michel, the Devono-Carboniferous rocks, forming the eastern boundary of the Crow's Nest coalfield, are in evidence nearly as far as the eastern end of the Crow's Nest lake, where there is a faulted contact with the Upper Cretaceous and Laramie measures. These measures continue for the next 4 miles, and are followed by beds of volcanic ash, agglomerates and Flathead shale beds, for 1¼ miles, until the Lower Cretaceous coal-measures are again met with, near Coleman. From Coleman to Frank the coalfield is very much disturbed, and at Frank the limestone is pushed right through the coal. At the western contact of these strata, there is a well-known sulphur spring, and at its eastern contact the coal-measures are turned up, and in fact partly turned over, by the limestone upheaval. This vast intrusion of limestone on the north side of the railway is known as Bluff mountain; on the south side as Turtle mountain; and the space between, through which the railway passes, is known as the Gap. For about 4½ miles east of Frank the coal-measures are disturbed and folded, and a fault forms the contact with the coal-seams and lignites of the Upper Cretaceous and Laramie measures. The Upper Cretaceous coal seams have been opened up to only a very limited extent.

One of the most noticeable of the great disturbances and movements of enormous masses of limestone-rock in this district is clearly demonstrated by the position of the Crow's Nest mountain, perched on the Upper Cretaceous measures, about 4½ miles north of the railway. This mountain is unclimbable by most people, but during last summer Edward Whymper's party succeeded in planting a flag-staff and flag on the summit. Mr. Whymper described it as the driest mountain that he had ever climbed, as it was devoid of either water or snow.

Other notable disturbances are common in the Alberta district of Canada, and an instance, near Banff, may be interesting, as the coal-measures there are based on the limestone and also covered with limestone, and the coal seams are both bituminous and anthracitic.

Rock-slide at Frank.—At Frank, where a huge rock-slide occurred about 4 A.M. on April 29, 1903, the coal-measures, as previously noted, have been cut through and tilted by the limestone forming Bluff and Turtle mountains. An adit-level has been driven into the coal near the foot of Turtle mountain, by the Canadian American Coal Company, Ltd., to a coal seam, from 12 to 16 ft. thick. Extraction

* A paper read at a meeting of the Manchester Geological and Mining Society, at Manchester, 1905.

[1] "Summary Report on the Operations of the Geological Survey for the Year 1900," by Dr. G. M. Dawson, *Annual Report* of the Geological Survey of Canada, 1900, 1903, XIII, section A, page 87; and *Ibid.*, 1901, 1904, XIV, section A, No. 759 and 767, maps.

[2] *Trans.* Inst. M. E., 1905, XXIX, page 56.

of coal by this level commenced in 1901, and developments had been carried out so vigorously from that date up to the time of the accident that the output had reached 600 to 1,000 tons per day. The main level had been driven 5,600 ft., and some of the rooms had been worked up nearly to the outcrop. The precise height of the mountain above the valley does not seem to have been known, but it was probably about 2,500 ft. There were no premonitory symptoms of a fall, and work was proceeding as usual at the mine. A train of loaded cars had just been drawn out of the colliery siding, when, about 4 A.M., a fearful rumble was heard, and the eastern face of the mountain slid down into the valley with appalling velocity. The only living witnesses of the fall were the train-hands. All the men engaged at the colliery-tipple, the cars, staging, machinery, coke-ovens and dwelling-houses, with their inmates, were swept away in a moment, and of the 83 people known to have lost their lives only 6 bodies were recovered. No one who has not been to the place and walked over the fallen mass of stone, and seen rails on end and other materials just showing above the débris, can form any adequate idea of the occurrence, and no photographs can do more than give a vague idea of the vast mass or sea of broken stones, which covers 900 acres of ground. A length of two miles of the Canadian Pacific railway-track was completely buried, and a mile or more of the Grassy mountain railway. The brakeman and operator of the train, which had just pulled out of the colliery siding, were the first men to cross the fall, and they did so to stop a passenger train and thus avert further disaster. The débris, as it lies in the valley today, gives a spectator the idea of a huge wave breaking on the sea-shore, with two gigantic petrified billows occupying about the center of the valley, and the broken water (of stones) running up Bluff mountain, on the opposite side of the valley, to a vertical height of 250 ft. above the original valley.

At the time of the disaster 19 men were engaged in the mine, 17 of whom saved themselves by digging a way out; but the other two are supposed to have been out on the tipple, and to have been swept away with the staging and machinery. The men who escaped, on getting out, said that their first intimation of something having gone wrong was a "surging of the hanging wall, and a crushing or falling of coal all around them," giving them the idea that an explosion had occurred.

So far as I know, it is still an open query as to what set 500,000,000 cu. yd. of limestone-rock in motion. Several theories have been propounded, one of which was that there had been an earthquake, but there does not appear to be anything to support this suggestion, any more than that at Lille, four miles to the north, and at Blairmore, two miles to the west, people were awakened out of their sleep by the noise and shock of the falling mass. Another theory was that water, formed from melting snow, had found its way to the base of the mountain and had thus formed a slippery bed, over which loosened rock, pressed down by the superincumbent mass above, began to move, and thus brought about the fall. It was also suggested that a hard night's frost, following a warm opening day of spring, was the force which set the mass in motion. Many other theories have been proposed, but they are quite outside the possibilities of the occurrence. I think that, as the Cretaceous rocks had been weakened and broken by upheaval and exposure on both sides of the outcrop of the coal-seam, the removal of the coal had the same effect as taking out a sprag from underneath the foot of Turtle mountain, and that the movement was thus originated. It may be observed, however, that the damage done within the mine was very slight, excepting near the entrance.

The adit-level has now been reopened, and a pit has been sunk near the Gap; and supposing that the working of the coal seam from the adit-level was the disturbing cause of the disaster, it appears possible, if not probable, that at some future date the disaster may be repeated, and the whole of the remaining portion of the town of Frank might be swept away. The number of empty houses in the town is sufficient evidence to a stranger that the miners of the district have not recovered sufficient confidence in the stability of the face of Turtle mountain to take up their residence beneath its shadow.

Mining in Greece.*

Greece contains considerable mineral wealth in silver-bearing lead, zinc, copper, manganese, iron, emery, sulphur and lignite, besides marble of many varieties. From 1861 to 1875 the Greek Government granted about 400 mining concessions, comprising an area of 190,000 hectares. Thirty stock companies were started to develop these concessions, but by 1896 only four of them still existed—the French Laurium Company, the Greek Laurium Company, and the companies of Dardeza and Seriphos. By 1904 four more companies were started—the Greek Mining Company and the companies of Locrida, Atlanti and Capsalo.

The industry has offered severe stagnation, with an accompanying sharp decline in stock values. One of the reasons contributory to this condition has been the declining rate of exchange, to the disadvantage of Greek money. Thus in 1902 the franc was worth 1.62 drachmas; in 1903, 1.58 drachmas; in 1904, 1.38 drachmas, and now about 1.20 drachmas. As these companies sell their products for gold, while their ordinary running expenses are paid in drachmas, the loss from this cause is considerable.

The French and the Greek Laurium Companies extract the silver-lead ore of this region. The Greek Company treats the slag and waste discarded by the ancients. This material contains only 3.5% of silver-bearing lead ore, and its annual production is about 7,000 tons, valued at $675,500. This ore is sent to Marseilles, where it is smelted and the bullion desilverized. The French Laurium Company works in the old mines; its output of 213,788 tons in 1903 comprised lead, manganese-iron, and zinc ores, and sulphur minerals. These are all treated at Laurium and the products sent abroad for refining. The output of the whole Laurium district in 1904 was 424,246 tons, of which 309,240 tons came from the surface works. This material was dressed by washing machinery and reduced to 202,826 tons, out of which the smelters have yielded 15,186 tons of silver pig lead containing from 1,648 to 1,851 grams of silver.

Besides the Laurium mines, there are in the island of Zea iron, lead, and manganese deposits. But little work is done, as these mines are not close to the sea and transportation is difficult. In the island of Thermia are iron mines which from 1896 to 1903 produced 148,150 tons of ore. In the island of Euboea are coal mines the product of which is sent almost entirely to Laurium for the smelting furnaces. In 1899 the international financial commission, to which the revenues derived from the sale of Naxos emery had been assigned, established a depot at Syra. This has been of advantage both to the Government and to the shippers of emery, for formerly steamers were obliged to receive their cargoes while lying in the open roadstead before Naxos, while now this is done in the harbor of Syra. The sale of Naxos emery in 1904 was 6,353 tons, of which 2,780 tons were shipped to Rotterdam, 1,203 tons to New York, 1,050 tons to Havre, 920 tons to Liverpool, and 400 tons to Philadelphia. The exportation for 1904 was the largest for several years and exceeded that of the previous year by 540 tons.

* From *Daily Consular Report*, No. 2,430, December 6, 1905.

The first application of the thermit process for pipe welding has recently been made in New York city for a refrigerating company. The pipes are laid in the ground and are used as service return pipes in the delivery of liquid ammonia at 180 lb. pressure to various cold-storage houses along the street. Twenty-nine 1¼-in. and twenty-seven 2-in. joints were welded. The pipe was welded on the ground to lengths varying from 40 ft. to 100 ft., then placed in the ditch, cuts made for connections and the final welding done with the pipe in place. On the 2-in. line an expansion bend was placed, while on the 1¼-in. this was not thought necessary.

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Coal Cutters in France.

One of our correspondents remarks that there is a very promising field in France for the application of mechanical coal cutters. At the present time less than 1 per cent. of the coal in French mines is extracted by means of mechanical coal cutters. In view of the scarcity of labor in the Eastern districts it is thought that mechanical cutting appliances would find ready application, if properly represented in the market. It is true that the seams in French mines are thin compared with British and American seams, but a machine specially adapted for the French conditions might speedily create a demand there.

Professor N. S. Shaler.

It is with much regret that we hear, as we go to press, of the death, on April 10, of Dr. N. S. Shaler, dean of the Lawrence Scientific School of Harvard University. Through a long and active service he had established a high reputation as a geologist, a teacher and a writer. Moreover, with all his work, he found time to take a strong interest in the vital questions affecting society and human life. Few men succeed in making a mark, as Dr. Shaler did, in so many departments. His strong personality and generous interest in humanity will be seriously missed; for he was one of those scholars—only too rare—who stimulated thousands, not only by his genuine learning, but even more by his ripe culture and his sympathy with the human side of his students.

The Monazite Industry.

The monazite industry of the Carolinas has been a good deal disturbed by the invasion of the American market by the Thorium trust of German producers, which controls the Brazilian supply of monazite. During the last few weeks, the price of thorium nitrate in the United States has been cut nearly 50 per cent. It is anticipated that this will freeze out some of the smaller concerns; at the same time the drop in the price of the nitrate has very seriously affected the mining operations in the Carolinas. Monazite sand, containing 5 per cent. of thoria, can hardly be delivered in New York even by the largest producers at less than 14 or 15c. a pound, but at present it will hardly fetch that much. The production of monazite in the Carolinas has been heretofore a thriving industry. It will be interesting to observe what will be the result of the struggle that has now been inaugurated.

The Coal Situation.

The coal situation still continues uncertain. In the East the anthracite companies, while rejecting the offer of arbitration made by the miners in terms, have submitted another in its place. This amounts to a re-submission of some of the points at issue, to the members of the Anthracite Strike Commission of 1903. At the same time the operators insist on the open shop and will not consent to anything which will abrogate that principle. It appears highly probable that the two interests will soon succeed in uniting upon some equitable basis. The proposition of the miners to arbitrate opened the way. The counter-proposition of the operators is fair and ought to be acceptable. Meantime the suspension of work in the mines continues; but there is no present scarcity of coal, and will not be for some time.

In the West the Pittsburg district is generally at work, the large companies having signed the 1903 scale. The independent operators, who were at first disposed to hold out, have been obliged to follow. The Ohio operators, however, have not agreed to sign, and their example is followed in Illinois; the Indiana companies being, apparently, inclined to settle. Competitive conditions will probably bring about a general settlement soon; and the large consumers do not anticipate a long suspension anywhere. A continuance of the strike would be very profitable to Pittsburg and West Virginia operators—and to those of Kentucky, who are already beginning to ship to the Northwestern markets.

Professor Hutton.

The engineering profession will learn with regret of the resignation of Prof. F. R. Hutton as secretary of the American Society of Mechanical Engineers, a position which he has occupied for 25 years. The reason for his resignation is the great increase in work in connection with the society, which has made it appear impracticable to carry on his duties as its secretary, together with those as the head of the Department of Mechanical Engineering at Columbia, to which he naturally feels he owes the first allegiance.

The work of Professor Hutton as secretary of the society has received the highest possible appreciation in the engineering profession. It is generally recognized that in building up the society his services have been invaluable, and that the high position occupied by the society today is largely due to him. It is satisfactory to know that there will not be a complete severance of the relation which Professor Hutton has so long borne to the society, but he will probably continue under some such title as honorary secretary, while the detail work of the office will be supervised by a business manager, with the title of secretary.

It is to be understood that Professor Hutton has not yet retired, and that no change has as yet taken place, but arrangements have been made for making the change mentioned above as rapidly as circumstances will permit without embarrassment to the society.

Colliery Explosions in West Virginia.

The numerous explosions in coal mines in West Virginia last year have, apparently, not taught any lesson nor led to improvement in the method of caring for the safety of the miners. During the present year, the death record on the West Virginia coal-field from colliery explosions is as follows:

January 4—Coaldale Colliery, Bluefield, 22 killed.
January 18—Detroit Colliery, Paint Creek, 18 killed.
February 8—Para Colliery, Fayette county, 30 killed.
March 22—Century Colliery, near Philippi, 32 or more killed.

The exercise of ordinary prudence would have made these accidents impossible. It has long been known that the mines evolve gas and contain large quantities of fine dry inflammable coal-dust. It is also known that the outflow of gas in the collieries varies with atmospheric conditions, or has periods of frequency. During these periods extra vigilance is needed in detecting the gas in watering or removing the dust from the workings and haulage roads, and in properly coursing full air currents throughout the mines, as well as in using safety lamps in all underground operations.

It is due to J. W. Paul, chief mine inspector of West Virginia, to say that he has repeatedly called attention to defects in the State mining law; and has urged the giving of increased powers to the mine inspectors, to enable them to correct, as far as possible, the present loose methods in working collieries. Defective ventilation, especially the failure to increase air capacity with the extension of mines, is a point to which he has referred, and his warnings seem to have been justified by the results of continued negligence.

It is evident from the large number of colliery explosions now being reported, that present atmospheric conditions throughout the United States are favorable for the evolution of gas in large quantities from coal seams. It is therefore probable that we will have to continue to chronicle such accidents until those conditions change.

It cannot, however, be too well impressed upon all who are responsible for the safety of the men engaged in coal mining throughout the country, that owing to the above mentioned atmospheric conditions the greatest vigilance will be required for some months. Any negligence in attending to the daily gas testing and adequate ventilation, is liable to result in dire consequences.

The Price for Tin.

This week the price for tin attained the highest figure on record, the quotation having been 38.6c. per lb. In January and February, 1888, the price of 37c. was reached, which up to that time was the highest on record, so far as we can determine. The price statistics for the early part of the last century are by no means complete. It is noteworthy, moreover, that the price of tin has now risen above the price for aluminum and is close to that for nickel, two metals which ordinarily are much dearer than tin.

The cause for the rise in tin is twofold. Primarily it is speculative, the spot and near-by supply having apparently been cornered in the London market; but fundamentally it is due to what is technically known as a strong statistical position; in other words an exhaustion of accumulated stocks and a demand which can be satisfied by supply only at enhanced prices.

The world's production of tin in 1905 showed a decrease of about 3000 tons, which occurred chiefly in the outputs of Banca and the Straits Settlements. In the latter country, which is the source of about 60 per cent. of the present supply of tin, the outlook is not at all promising, the cost of production having increased both on account of the exhaustion of the richer and more easily worked alluvial deposits, and also by the rise in the value of silver, and the currency question in general. It is believed that production has reached its maximum, and unless new discoveries of importance are made, there is a probability of further decrease in the output during 1906.

The situation naturally raises the question where is the world's requirement for tin going to come from? At the present time, Bolivia is the only country which is showing any material increase in production, and its increase in 1905 was not very large. However, production there was hampered by drought, while the lack of cheap transport facilities is always a difficulty. The former was only a temporary drawback, and the latter will be remedied. The Bolivians are anxious to become the largest tin producers of the world, and it is not impossible that eventually they may attain that position, but it will not be in the near future. In this connection it is a source for wonder that arrangements are not made to import Bolivian ore into the United States for smelting here. There is a modern tin smelting works, ready for operation, which has never been operated because of lack of ore supply, the Straits Government having imposed an export duty on ore when it appeared that exports might be made. The explanation of the failure to import Bolivian ore is perhaps the preponderance of Germany in Bolivian trade.

The high price for tin is naturally stimulating developments in all parts of the world, especially in Tasmania, Victoria and other Australian states, where there are large deposits of exceedingly low-grade ore, which can never be worked at a profit if not now. Moreover, it is reported that certain ancient mines in Saxony, which have been idle for many years are now being reopened. It has even been whispered that the Harney Peak mines, in the Black Hills, may be untangled from litigation and tried again as a mining venture, but unfortunately this rumor is incorrect. This is to be regretted, for it seems to us that if tin is ever going to be produced from the deposits so far proved to exist in the United States, now is the time to begin. We have previously expressed our belief in the possibility of working some at least of the Dakota mines; we think that in the great advance in the art of mining and milling low-grade ore, the low-grade tin ores have been generally lost sight of.

Metallics.

Thorianite, a mineral high in thoria, is reported to have been discovered in commercal quantity in Ceylon.

The beautiful green gold shade that is used on jewelry is prepared by making an alloy of 19 parts fine gold to five parts of fine silver.

White copper, known as the Chinese white copper, is usually made of an alloy of 40 parts copper, 32 parts nickel, 25 parts zinc and 3 parts of iron.

A new mining regulation in Western Australia prohibits the use of any safety fuse which burns in less than 60 or more than 100 seconds per lineal yard.

For removing sand from small brass castings, hydrochloric acid one part and water 10 parts makes about the best solution that is used in ordinary practice.

A cement for securing brass work to glass is made with two parts of litharge, one part of white lead, three parts of linseed oil and one part of gum copal. It should be mixed immediately before using.

Sodium amalgam, judiciously used, will assist amalgamation slightly. Its employment should not, however, be overdone, because it has a tendency to soften the amalgam to such an extent that eventually the plates become bare.

It is hard to obtain a heavy deposit of nickel by any of the ordinary electrolytic methods; that is to say, a deposit which is strongly adherent. The nature of the metal is such that it cannot ordinarily be used for heavy coatings.

It is important in gold milling to have clean mercury; that which is recovered from the retort often is insufficiently refined. There are various ways of keeping mercury clean. Either dilute nitric acid, or cyanide solution, used on the mercury gives it a clean, bright appearance.

The core oven in foundry practice on light work is usually kept at a temperature of about 400 deg. F. Steam heat is used sometimes for light work, but as it is difficult to get more than 250 deg. from this source, the cores are not thoroughly baked, and results are far from satisfactory.

Base bullion in bars, or in molten condition, direct from the furnaces, is sampled by running into a 30-ton kettle, heating thoroughly, mixing by jet of dry steam, cooling, skimming off impurities, mixing again, and taking out a sample by the use of a dipper holding approximately 5 lb. of bullion.

Don't be in too big a hurry to go back to a burnt hole or "stinker," or to re-prime a missed hole. It is safer to re-prime within an hour, say, than to work over a hole that has missed fire for a half shift. Missed holes will remain apparently dead for several hours without any sign of life, and then, unexpectedly go off.

Some heavy nuggets of gold have been found in the northwest country of Western Australia. The "Bobby Dazzler" nugget, found at Marble Bar in March, 1900, weighed 487 oz. 13 dwt. in the rough and smelted at 413 oz. 13 dwt. A nugget named "The Little Hero," found at Shaw Fall, Pilbarra, weighed 330 oz. 13 dwt.

Mercury tempering is used for drills which are to be employed in perforating glass plates. The drill is heated to a white heat and plunged into the mercury, which makes it extremely hard. The drill is kept moist with a saturated solution of camphor and oil of turpentine. The process requires considerable care and labor to produce good results.

Thick tin, i.e., tin which has oxide mixed with it, may be revivified by the use of small quantities of phosphor-tin while in the melted condition. The usual proportions are 2 oz. of phosphor-tin to 100 lb. of the metal itself, added in portions of about 0.5 oz. at a time, stirring thoroughly. The phosphorus reduces the oxide to metallic tin. At the same time, oxide of phosphorus is formed, which rises to the top of the bath as a liquid slime. The method is used with excellent results in practice.

Ordinary laid ropes are suitable where the drum and pulleys are large, and where it is important that the rope should not have much tendency to spin on its own axis; for instance, in shafts where there is very little space between the two cages and no dividing guides. Lang's lay ropes are more suitable for winding where the drums and pullies are comparatively small, and where there is severe side-friction; for example, in shafts where the distance from the drum center to the pulley center is so short that, in relation to the winding depth, the rope has a bad lead.

The special advantages of the "locked-coil" rope are: It does not rotate or "spin" on its own axis when loaded, and it elongates less than ropes composed of strands. The disadvantages are, there is a loss of about 40 per cent. in the tensile efficiency of the material employed. The central portion sometimes breaks without giving indication on the exterior, and sometimes the outer wires become "unlocked" in consequence of the several concentric coils of wire being under unequal tension when the rope is loaded with a given strain.

Matt finishing on brass ware by immersion is done by the use of the regular bright dip of one part nitric acid to two parts sulphuric acid, to which has been added a solution of the former in which some zinc has been dissolved. This should be added gradually, as it is not possible to determine exactly what amount is required to produce the proper color. The articles must of course be perfectly clean, and after the matt finish has been applied they should be dipped in the bright dip, cleaned and dried, or finished in whatever additional coloring may be required.

The economy demonstrated by the use of low-grade fuels depends upon certain specific conditions—the comparative cost of low-grade fuels and their calorific values, together with that of higher-grade fuel with its calorific value; and whether the lower-grade fuels are burned under conditions which will insure the development of the full calorific value of the fuel. The percentage of incombustible matter in low-grade fuels is usually not high, as it varies from 9 to 20 per cent., and is of comparatively slight importance. Small fuel is not necessarily of low calorific value.

The advantages of a rope laid to an obtuse angle are: It will offer the least resistance to being bent, and it is lighter than a rope laid to an acute angle. Its disadvantages are: Under compression it readily loses its shape, it is difficult to make an effective splice, or to fix any attachment to it. It is a practical detail of some importance that where a splice has to be made the angle of lay in the ropes must be the same; it is impossible to splice two ropes of different lays effectively. The advantages of a strand laid to an obtuse angle are: The maximum flexibility and the mininmum of weight. Its disadvantages are: Lack of solidity and resistance to compression.

Although the cost of underground pumping by compressed air may be considerably reduced by the use of reheaters, the conclusion should not be jumped at that it is always advisable to install them. In places where the ventilation is poor they are entirely out of the question. It has been observed that the gases of combustion have a decidedly injurious action on hauling ropes, if allowed to pass up the same shaft, and it is, no doubt, this fact which has prevented more attention being paid to reheaters. Another point is the fact that most underground air pumps are of small size and a saving of 30 per cent. in operating expenses does not mean much when reduced to dollars and cents.

The electrolysis of pipe lines about mines or metallurgical works having an electric plant is something that is rarely considered. Nearly every plant having its own electrical equipment has also a Weston volt meter, and this is one of the best means of determining whether the electrolytic action is sufficient to cause danger of corrosion or failure of any buried piping from this cause. Measurements can be easily made, and there is really no reason why they should not be. If a ground connection to a live terminal is provided at any place in the plant, such tests should certainly be made, between a metallic contact and the earth, or between the metal parts to be tested for corrosion or electrolytic action.

Colliery Notes.

The amount spent on colliery improvements by the Lehigh Coal and Navigation Company in 1905 was 14.8c. per ton of yearly output. This is a little over the average of the past 10 years.

The latest large sale of working anthracite collieries in Pennsylvania was at the rate of about $10 per ton of yearly product. As the money was raised chiefly by an issue of 4 per cent. bonds, this involved a capital charge of 40c. per ton of coal mined per year.

In the 11 years 1895-1905 the fixed capital employed in coal mining by the Lehigh Coal and Navigation Company decreased from $2.329 to $1.720 per ton of yearly product. The output of anthracite during that period increased from 1,402,010 tons in 1895 to 2,428,304 tons in 1905; a gain of 73.2 per cent.

It is estimated that the bee-hive coke ovens in general use in the United States waste yearly from 350,000 to 400,000 tons of ammonium sulphate, which has high value as a fertilizer. In Germany most of this waste is avoided by the use of the improved ovens in which the by-products of the coal are saved.

The report of the Lehigh Coal and Navigation Company, which gives the cost of anthracite coal uncomplicated by transportation charges, shows that from 1900 to 1905 the average amount received by the company for coal increased 49.9c. per ton. In the same period the cost of mining increased 41.3c. per ton, chiefly on account of the higher wages paid.

In sizing bituminous coal, the Pittsburg scale, which is generally used throughout the West, provides for four grades: Run-of-mine, or unscreened coal; lump, which includes all coal passing over a straight bar screen with bars 1¼ in. apart in the clear; nut, which includes all coal passing through a 1¼-in. and over a ¾-in. screen; slack, including all that passes through the ¾-in. screen.

Experience has shown that fine dry coal-dust on the floor of colliery workings is subject to distillation when in contact with the hot gases of a blown-out shot. It requires a very small quantity of the dust to yield highly explosive gas. To minimize danger from this cause, it is essential to water effectively the surfaces about a shot hole immediately before firing, except of course where these surfaces are normally wet.

Short wooden coal cars of considerable depth are in use on a number of Southern railways, but as a general thing the longer and shallower gondola type of car is preferred. With the high center of gravity of the deep cars, they give considerable trouble on lines having many sharp curves, as they tend to ride hard on the side bearings and so make it difficult for the trucks to swivel when entering and leaving curves.

As a general rule pillars are best worked lengthwise to the rise of the coal seam, unless the latter become very steep, when it is usually more economical to cut the pillars so that the long side is at right angles to the inclination. In this way a larger amount of coal can be worked from a level floor. The most important point to keep in mind in laying out the workings, is to have the pillars wherever possible running parallel with the main joint system in the coal seam.

Fire damp explosions by shot firing in dangerous mines can be minimized by employing powerful detonators. The fulminating portion of the detonator should be properly enclosed, as only such caps which do not suffer leakage can be relied on. Another advantage gained by the employment of detonators is increased efficiency from the explosive charge. It is estimated that the explosive force is increased as high as 10 per cent. by good detonation.

In the manufacturing of coal briquets a binder is generally used to improve their carriage and storage properties. For this purpose coal-tar pitch is extensively employed. Owing to the high cost of this in some localities, it is necessary to use other materials. Ashphalt pitch, a mixture of sago flour and a small quantity of pitch, low-grade molasses, rosin, and a mucilaginous liquor obtained from paper mills, have been successfully used instead of tar-pitch. The chief requisites of a binder are adhesiveness, quick setting, and combustion without ash.

In some English collieries which give off large volumes of fire-damp, and are dry and dusty, dynamite and safety explosives are used with water-cartridges. These consist of a cylindrical case of water-proof paper 18 in. in length and 2 in. in diameter. The explosive is placed in the center of this case, and is kept in position by thin metallic webs. A detonator for electric firing is attached to it by the necessary wire. Before charging, the space between the cartridge and the cylinder enclosing it is filled with a viscous liquid, such as is formed when soap is boiled for some time with water.

The most suitable position for a blasting charge in a coal seam depends upon various circumstances, a proper knowledge of which can only be obtained by practical local experience. It may be generally stated, however, that all joints, partings and other fissures should be avoided, and the hole for the charge should be so directed as to enable the charge to meet with equal resistance as nearly as possible, in every direction from the expected plane of fracture. The direction of fracture is determined by any cracks near the hole, as the explosion takes effect along the line of least resistance.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters shoud be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The California Tonopah Mine.

Sir—My attention has been called to this statement published in the New York *Commercial* of March 24.

California Tonopah. (I omit statements for which I am not held responsible) "A drift is to be run over the vein on the 700-level. Mr. Shockley is quite sure that an ore shoot of very high grade will be encountered at this point."

The only statement I have made with regard to this property was published in the local papers and was to the effect that the California Tonopah has a fair chance of finding an orebody. I base this on the geological report of Mr. Spurr, and on the fact that a small amount of good ore has been found in the mine. It is hardly worth while to go into further detail but I do not wish to be quoted as making predictions of the above character.

W. H. SHOCKLEY.

Tonopah, Nevada, March 29, 1906.

Ore Dressing by Flotation.

Sir—In regard to the flotation process, now attracting the attention of investigators, this scheme was investigated and used about 20 years ago by Albion M. Rouse. Mr. Rouse followed this work in treating successfully the refractory telluride ores of Boulder county, Colorado.

His scheme was the fine grinding of the quartz ores containing the tellurides; sliming the same; treating with a hot-water solution; adding lime enough, and dilute acid, by which carbon dioxide is formed, causing such effervescence that the fine particles of ore are attached to the bubbles, and thus brought to the surface and skimmed off.

Mr. Rouse stated to me that the cause of the attaching of the metallic particles to the bubbles was on account of some metallic attraction, as non-metallic particles were not raised by the bubbles.

J. A. SNEDAKER.

Denver, Colo., Mar. 30, 1906.

In the article by W. Spencer Hutchinson, published in our issue of March 3, 1906, the two illustrations on page 420 were incorrectly designated. The words "Near El Potrerito" in connection with the first illustration on this page should have been omitted. The second illustration should have been designated "El Pilar de Cienega, near El Potrerito," and not "Rear View of El Pilar Socorro."

Electric Mine Locomotives.

For the rapid and economical production of coal, probably nothing has been of greater service in those collieries where the conditions admit of their use than the electric mine locomotive. One of these locomotives is still in active operation, since first put into service in 1889. Improvements and new types have since that time been developed to meet various conditions of mine service.

The illustrations show a number of these types in operation. Among the more recent are the combined rack rail tracks at a distance from the trolley wire. When so operating, the locomotive is arranged to take current through a flexible insulated cable wound on a drum carried by the locomotive. When it is desired to leave the main tracks, the end of the cable is connected to the trolley wire, the trolley pole is lowered and the locomotive operated by current taken through the cable. As it runs away from the trolley wire, the cable is automatically paid out and as it returns again, it is automatically wound up with uniform tension and in even layers. This type of locomotive has been introduced by the

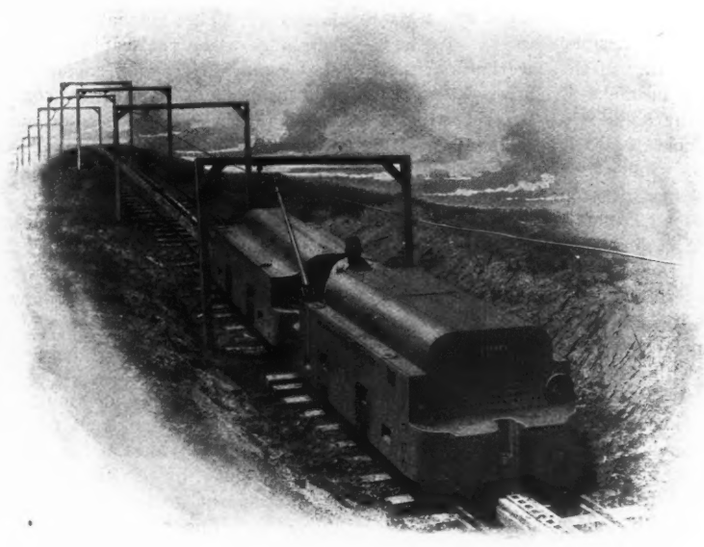

FIG. 1.

and friction traction locomotives shown in Fig. 1. These are provided with sprockets for propelling the locomotive up steep grades, where friction traction alone would be inadequate. A perforated steel plate of proper strength and wearing qualities forms the rack in which the sprockets run. The locomotives shown are arranged so that they may be propelled either by friction traction or by the sprockets and the rack. The economy of such a combination is self evident. It is necessary to provide the rack only on grades where the locomotive is unable to perform its duties through friction traction alone.

The locomotive, shown in Fig. 1, is designed for heavy duty where it is necessary to retard or to haul trains on steep grades. Each unit is provided with two sprockets, one on either axle. In actual tests the locomotive shown has hauled a train up a 10 per cent. grade, which required an effort on the rack of 22,000 lb. The motors were not severely taxed in this duty.

Fig. 2 shows a Jeffrey electric gathering locomotive in operation. The feature of these locomotives which distinguishes them from other types, lies in their ability to operate in mine rooms and on side

FIG. 2.

Jeffrey Manufacturing Company, and is proving successful; it is rapidly replacing mules and horses in mines, and many of the largest operating companies in the United States today are adopting electric gathering and hauling locomotives, to the entire exclusion of animal haulage.

Petroleum in California.

Bakersfield stands at the junction of two transcontinental railroads, the Southern Pacific and the Santa Fe. These afford ample facilities for shipping the crude oil, large quantities of which are used as fuel by the ralroads and manufacturers of California.

A pipe line extends from Bakersfield to San Francisco, a distance of about 300 miles, and a considerable portion of the oil is pumped through these pipes. It is necessary, however, to maintain pumping plants about six miles apart.

The oil district just north of the city of Bakersfield, Cal., known as the "Kern oil fields," has recently been surveyed by the United States Geological Survey. The oil resources of this region have already been extensively developed, and the numerous oil companies operating in the field have had full need of the enormous tankage system which has been installed. A number of the tanks have a capacity of a million and a half barrels each. The topographic features of these oil fields indicate, too, that further development may be expected to the north, toward Paso creek. Lying as it does in the foot-hills of the Sierra Nevadas, this district has one thing which is an absolute necessity in the industry—that is, an abundant water supply. A power plant on Kern river supplies electricity to Bakersfield and the adjacent country, and also furnishes power to Los Angeles. As Los Angeles is about 170 miles distant from the plant this necessitates one of the longest power lines in the country.

P. Dobler, Munich, Germany, comminutes mica (Brit. Pat. 23,149, Nov. 10, 1905) by first heating it for several hours in a closed vessel, so that it is opaque on cooling, and afterward subjecting it in a closed vessel to the action of steam or hot water, and finally grinding it.

The National Plant of the American Smelting and Refining Company.*

BY O. PUFAHL.

This plant, at South Chicago, Ill., refines base lead bullion. It comprises four reverberatory furnaces, of which one takes a charge of 100 tons, one 80 tons, and the other two 30 tons each; one of the small furnaces is being torn down, and a 120-ton furnace is to be built in its place. The furnaces are fired with coal from South Illinois, which contains 11 per cent. of ash.

In softening the bullion, the time for each charge is 10 hours. The first portion tapped consists of dross rich in copper, which is followed by antimonial skimmings and litharge.

The copper dross is melted up in a small reverberatory furnace, together with galena from Wisconsin of 80 per cent. tenor (containing 80 per cent. lead) for work-lead and lead-copper matte, the latter containing about 35 per cent. of copper; this matte is enriched to 55 per cent. copper by the addition of roasted matte and is finally worked up for crude copper (95 per cent.) in a reverberatory furnace. All the copper so produced is used in the parting process for precipitating the silver. The antimonial skimmings are smelted in a reverberatory furnace, together with coke cinder, for lead and a slag rich in antimony, which is reduced to hard lead (27 per cent. antimony, 0.5 per cent. copper, 0.5 per cent. arsenic) in a small blast furnace, 14 ft. high which has 8 tuyeres.

The softened lead is tapped off into cast-iron desilverizing pots, which usually outlive 200 charges; in isolated cases as many as 300. For desilverizing, zinc from Pueblo, Colo., is added in two instalments, being mixed in by means of a Howard stirrer. After the first addition there remains in the lead 7 oz. of silver per ton; after the second only 0.2 oz. The first scum is pressed in a Howard press and distilled; the second is ladled off and is added to the next charge. The Howard stirrer is driven by a small steam engine suspended over the kettle; the Howard press by compressed air.

For distilling zinc scum, 12 Faber du Faur tilting retorts, heated with petroleum residue, are used. The argentiferous lead (with 9.6 per cent. silver) is transferred from the retort to a pan lined with refractory brick, which is wheeled to the cupelling hearth and raised by means of compressed-air cylinders, so as to empty its molten contents through a short gutter upon the cupelling hearth. The cupelling hearths are of the water-cooled English type, and are heated by coal with undergrate blast. The cast-iron test rings with reinforcing ribs, are made in two pieces, slightly arched and water-cooled; they are rectangular, with rounded corners, and are mounted on wheels. The material of the hearth is marl.

Argentiferous lead is added as the operation proceeds, and finally the doré bullion is poured from the tilted test into thick bars (1100 oz.) for parting.

The desilverized lead is refined in charges of 28 tons (4 to 5 hours) and 80 to 90 tons (8 to 10 hours), introducing steam through four to eight half-inch iron pipes. The first skimmings contain a considerable proportion of antimony and are therefore added to the charge when reducing the antimonial slags in the blast furnace. The litharge is worked up in a reverberatory furnace for lead of second quality. The refined lead is tapped off into a kettle, from which it is cast into bars through a siphon.

The parting of the doré bullion is carried out in tanks of gray cast iron, in which the solution is effected with sulphuric acid of 60 deg. B. The acid of 40 deg. B. condensed from the vapors is brought up to strength in leaden pans. In a second larger tank, which is slightly warmed, a little gold deposits from the acid solution of sulphates. The solution is then transferred (by the aid of compressed air) to the large precipitating tank, and diluted with water. It is here heated with steam, and the silver is rapidly precipitated by copper plates (125 plates 18x8x1 in.) suspended in the solution from iron hooks covered with hard lead. After the precipitation, the vitriol lye is siphoned off, the silver is washed in a vat provided with a false bottom, is removed with a wooden shovel, and is pressed into cakes 10x10x6 inches.

The refining is finished on a cupelling hearth fired with petroleum residue, adding saltpeter, and removing the slag by means of powdered brick. After drawing the last portion of slag the silver (999 fine) is kept fused under a layer of wood-charcoal for 20 minutes, and is then cast into iron molds, previously blackened with a petroleum flame. The bars weigh about 1100 ounces.

The gold is boiled with several fresh portions of acid, is washed and dried, and finally melted up with a little soda in a graphite crucible. It is 995 fine.

The lye from the silver precipitation, after clearing is evaporated down to 40 deg. B. in leaden pans by means of steam coils, and is transferred to crystallizing vats. The first product is dissolved in water, the solution is brought up to 40 deg. B. strength, and is allowed to crystallize. The purer crystals so obtained are crushed, and are washed and dried in centrifugal apparatus; they are then sifted and packed in wooden casks in two grades according to the size of grain. The very fine material goes back into the vats. From the first strongly acid mother liquor, acid of 60 deg. B. is prepared by concentrating in leaden pans, and this is used for the parting operation.

*Abstract from a paper in *Zeit f. Berg-Hütten-. u. Salinenwesen im Preuss. Staate*, 1905, p. 400.

Notes from Southern Nevada.

SPECIAL CORRESPONDENCE.

The northern hillsides are still deep in snow, much to the annoyance of prospecters and promoters. All look for a great influx of mining men in the spring. In Tonopah the principal talk is of the consolidation of West End, Ohio-Tonopah and McNamara. The consolidation will be of most advantage to the first-named company. The 400-ton mill of the Tonopah-Nevada is nearing completion.

Manhattan is still going very strong; no less than seven new companies were listed in the San Francisco exchange last week. The Manhattan Consolidated continues to be the leading mine, it still shows much free gold, so much, in fact, that "glommers" take away considerable value in their pockets. One visitor to Manhattan brought back a pint whisky flask full of leaf gold; the value would perhaps be $200. Sampling across 12 ft. of the west incline on this mine gave an average of over $200 per ton.

It is thought that the lawsuits tying up the rich ores of Litigation Hill will soon be ended. This will release a number of claims controlled by Manhattan Dexter Mining Company.

At Austin there is an embryo mining revival. In the camp itself only 25 men are working, but there are several camps to the south of Austin showing rich gold specimen rock, which will attract many men this spring. At Millet several mining men from Colorado Springs report good prospects. Gold Park, an old mining camp, will probably be heard from in the near future. At Kingston the chief mine is bonded for $250,000, and it is thought the option will be exercised. Rich silver-lead ores have been found at San Juan, 35 miles south of Austin. The Nevada Central Railroad running from Battle Mountain to Austin, 93 miles, is now bonded to strong people, and will probably form one link in a north and south road extending from Bullfrog to a station on the Western Pacific, near Battle Mountain.

F. M. Smith (the Borax King), with his lieutenants and some London capitalists, who have furnished most of the money to build the Tonopah & Tidewater Railroad, now being built from Ludlow on the Santa Fé to Bullfrog, has lately been in Tonopah, and announces his intention of speedily finishing the railroad to that place.

Considering all, there is every evidence that the Southern Nevada boom is in its infancy, and men of mining knowledge with capital and courage can find good chances for business here. Cautious investors who wish to buy mines on the systems of valuation in vogue among conservative engineers had best remain at home. There is no opening for them in Sage Brush mining camps.

Iron Ore in Ontario.*

BY PHILLIPS THOMPSON.

There are three special reports dealing with different areas where iron ore is known to occur. The first of these, by W. N. Smith, treats of the Loon Lake iron-bearing district, recently searched by prospectors. Loon lake, about 26 miles east of Port Arthur, is favorably situated as regards transportation. The Canadian Pacific railway, which passes through the district, gives a short haul to Port Arthur; and Thunder bay is within four miles of Loon lake. The Animikie iron-bearing series, in which the ore of the area occurs, is the eastward continuation of the Mesabi or Upper Huronian series of Minnesota. It attained some prominence in connection with mining about forty years ago, when extensive explorations for silver and iron ore were undertaken. Although silver was successfully mined for some time, iron was not then found in paying quantity, and only latterly has active prospecting been resumed.

Four definite horizons are present in the Animikie formation, as follows: 1, a lower iron-bearing member; 2, an interbedded black slate; 3, an upper iron-bearing member, and, 4, an upper black slate. These horizons indicate a continuous period of deposition during which the conditions varied between those of a chemical and probably also an organic sedimentation, producing the iron-bearing formation, and those of mechanical sedimentation with the production of the slates. It is believed that the general processes and agencies which produced the iron-bearing formation in this area are analogous to those which produced the iron-bearing members of the ranges on the south side of Lake Superior. The original rock of the upper horizon is a rather thin-bedded cherty iron carbonate, varying in color from a dark gray to a very light color; although the most characteristic phase of the unaltered carbona a dark, high-banded rock with the surface exposures usually showing brown limonitic weathering. In texture, it varies from a dense homogeneous rock in which no definite mineral outlines can be distinguished, to one in which a carbonate cleavage is apparent; though in the latter case it is probable that the coarser carbonate crystals are secondary.

A common phase of this horizon is a banded rock, composed of alternating layers of iron oxide or partially altered carbonate, analogous to the banded ferruginous cherts and slates of the iron-bearing districts of the South Shore. All stages and gradations can be observed, from the original unaltered cherty carbonate rock, through the ferruginous cherts and slates, to iron ore. The total thickness of this horizon is believed to be about 200 to 250 ft. The passage of the iron formation into the black slate above is not exposed in this area, but it is supposed to be one of gradual transition, as in the Mesabi of Minnesota and elsewhere.

The lower iron-bearing horizon, except where extremely altered, can be distinguished from the upper by the constant presence of small granules, which are absent from the upper horizon. When the alteration to hematite has not gone far, it is similar in appearance to the ferruginous chert or "taconite" of the Mesabi range. This is especially the case when the granules are embedded in a dense greenish or dark-gray silicious matrix; but frequently in this area the matrix is largely carbonate material, varying from exceedingly fine to coarse-grained, in which respect it differs from the ferruginous cherts of the Mesabi.

The carbonate of this horizon is not pure iron, but a calcium-magnesium-iron carbonate.

Two phases of the rocks of this formation, which carry a sufficiently high percentage of iron to be classed as ore, are characteristic. One is a fine-grained red or blue hematite of medium hardness. The other has a texture of medium to coarse-grained carbonate rock with the red color of hematite.

The localities in which the greatest concentration of ore has so far been proved, are comprised within an area extending four miles west, two miles south and one mile east of Loon lake.

Prof. Willet G. Miller reports briefly on the Boston township iron-range, discovered two or three years ago; this is situated some 50 miles north by a little west of New Liskeard in the Nipissing district. The iron formation is a jaspilite, similar in character to those of Temagami and other parts of Ontario, and of the Vermilion range of Minnesota. It is magnetite, interbanded with jasper and other silicious material. The formation has an approximate length of seven or eight miles, and has been subjected to considerable disturbance by the intrusion of igneous rocks, to a greater extent than almost any of the other iron ranges of Ontario or of the Lake Superior region of the United States. The width, however, is usually not more than 90 or 100 ft.; the greatest width seen by Professor Miller being 300 ft. Its narrowness is probably due to its being split up and separated by intrusions. The township has until lately been difficult of access; but has now railway communication, as the Timiskaming and Northern Ontario railway runs close to the western side of the range.

The concluding portion of the report is a paper on the iron ranges of Michipicoten West, by Dr. James M. Bell, and comprising the results of an exhaustive investigation of this area, which lies on the north shore of Lake Superior encircling Michipicoten bay. The Huronian rocks have a surface area of some 1,700 sq. miles, and are contained between north latitude 47 deg. 30 min. and 48 deg. 30 min.; and from longitude 84 deg. to 86 deg. west.

They may be divided into four divisions: the south section includes all Huronian rocks, from the point four or five miles north of Point Gargantua to the Michipicoten river, and as far east as the mouth of its tributary, the Sequamka. This includes the South Michipicoten iron range.

The East section extends eastward from the Magpie river to the Michipicoten and Sequamka rivers; it contains the Helen mine and other deposits. To it also belong the small broken bands of rocks west of the Magpie near Michipicoten Harbor.

The Northern Michipicoten Huronian section, enclosed between two granite areas, lies between the Magpie and the west branch of the Pucaswa river.

The Western Huronian area (to the description of which the paper is more specially devoted) is separated from the other sections by intrusive granitic rocks and includes three small patches of Huronian rocks, separated by later granite. It is situated between Otter Head and Bear river on the Lake Superior shore, and extends a short distance north of Lake Michi-Biju. It is a rugged region of hills and valleys, abounding in lakes, and intersected by numerous streams and water courses—the principal means of communication being by canoe routes.

In Lower Huronian times, thick igneous rocks were deposited, associated with which were water-laid sediments. There were, subsequently, great intrusions of both acidic and basic rocks; the former taking place when the intense folding of the strata was well advanced; and the latter occurring when the folding had almost or entirely ceased.

The Helen formation occupies a position generally close to the overlying Doré conglomerate, though sometimes masses of green schist intervene. It consists of allied and related rocks which, named in the order of their importance, are: banded chert, massive granular chert, sideritic chert, pyritous chert, banded jasper, rusty quartzite, grüneritic and other amphibolic schists, cherty siderite, and iron ores, with hematite, magnetite, pyrite and even pyrrhotite. Beside these ferriginous rocks, the formation includes a number of argillaceous rocks, which are found not only interstratified with the ferruginous rocks, but also above and below them.

The Helen formation (which is chiefly

*Notes from Fourteenth Report of Ontario Bureau of Mines, 1905.

a chemical sediment but also in part mechanical) was once much more extensive than at present. By far the greater part has disappeared as the result of glacial erosion which has laid bare the rock in every part of the district. But glacial denudation has been most unequal in different parts, doubtless owing to the influence of pre-glacial topography.

In the northern range, the beds are everywhere folded into extensely compressed folds; concentration of the ore has been found at the bottom of the trough. As the greatest part of the ore concentration took place prior to the period of glacial denudation (when the Helen formation was still extensive), it is reasonable to expect that orebodies of considerable magnitude may still be found. Deep troughs of this nature may be said to occur at Iron lake, at the Frances mine, Brotherton Hill, the Leach lake bands, etc.

Structural conditions are different in the Western range. The beds are broadly folded, but not so intensely corrugated as on the Northern range; and for this reason they appear in monoclines (or what seem to be such), though the angle of the dip of the beds varies from 12 degrees to the vertical. Gentle folds may traverse the monoclines producing shallow troughs, in which ore-enrichment may be expected; or dikes or bosses of eruptive rocks may, in some cases, have given the necessary basin. In general, the iron formation of the western range is much more highly ferruginous than on the northern. Among localities of fairly favorable appearance in the Western range, are mentioned Lost lake, the bands outcropping on the shore of Lake Superior near the Julia river, and the claims north of Davids lakes.

The report is lavishly illustrated and contains maps and plans which materially enhance its value. Those interested in the various phases of mining industry in Ontario (which has latterly attracted much American capital) will appreciate this latest addition to the literature of the subject.

L. Doermer has observed (*Berichte*, 1906, XXXIX, 211-214) that when pieces of commercially prepared calcium, or the powdered metal are struck with a hammer upon an anvil, sharp explosions occur. These may perhaps be accounted for by reaction with the layer of rust, since if this is carefully removed, the effect is much less marked.

P. Dobler, Munich, Germany, comminutes mica (Brit. Pat. 23,149, Nov. 10, 1905) by first heating it for several hours in a closed vessel, so that it is opaque on cooling, and afterward subjecting it in a closed vessel to the action of steam or hot water, and finally grinding it.

Abstracts of Official Reports.

Isle Royale Copper Company.

Development work in 1905 amounted to 4616 ft., of which 3828 ft. was in the Isle Royale lode. The results of the last two years compare thus:

	1904.	1905.
Ore hoisted, tons	178,046	226,788
Ore stamped, tons	154,830	195,150
Mineral recovered, lb	3,343,010	4,032,402
Fine copper in mineral, %	73.075	73.747
Fine copper per ton ore, lb.	15.8	15.2
Copper yield, lb	2,442,905	2,973,761
Cost per lb. copper, for:		
Mining and milling	9.62c.	9.19c.
Construction	0.20	0.34
Smelting, freight, selling, etc.	2.20	2.05
Exploration, development, etc.	1.28	1.18
Total cost	13.30c.	12.76c.
Cost per ton ore stamped, for:		
Mining	$1.215	$1.152
Stamping	0.305	0.248
Total	$1.520	$1.400

The copper was sold at an average of 15.53c. per lb., fetching $461,687, which interest and other income increased to $447,400. Mining and milling cost $273,340; smelting, transportation and marketing cost $60,803; and $45,270 was spent for new construction, railroad building and exploration, leaving a net profit of $97,987 on the year's work. Adding the balance brought forward, gives a total of $615,626 now on hand.

Mass Consolidated Mining Company.

Development was driven actively during 1905, resulting in an advance of 626 ft. in shafts, 7128 ft. in drifts on lodes, and 1454 ft. in crosscuts. Of the 197,106 tons of ore hoisted, 53,676 tons were discarded, leaving 143,430 tons to be stamped. This yielded 1,876,320 lb. of mineral, in addition to which 885,170 lb. of mass copper was obtained from the mine, making a total of 2,761,490 lb. of copper mineral averaging 72.712 per cent. metal, from which 2,007,950 lb. of fine copper was recovered.

On the basis of one ton of ore stamped the costs during 1905 were: For mining—drifting, $0.095; stoping, $0.651; timbering, $0.045; picking and sorting ore, $0.038; tramming, $0.122; hoisting, $0.174; repairs and general underground expense, $0.067; total underground, $1.192. Surface expenses were $0.144; stamping, $0.569; freight, $0.179; smelting, $0.130; and general expenses, $0.194. The amount spent for exploration, development and construction averages $0.805 per ton, making a total cost of $3.213 per ton of ore stamped. Rents and the charges for custom stamping offset surface and milling expense by the amount of $0.461 per ton, making the net cost of production $2.752 per ton.

Sales of copper (at 16.433c. per lb.) brought in $329,962 and of silver (2365 oz. at 66.5c.) netted $1573; interest brought total receipts up to $334,534. Working expenses, less the rents and custom charges above referred to, totalled $279,455, and $115,461 was spent on exploration, construction and equipment, making a net loss of $60,382 on the year's work. The cash balance brought forward, augmented during the year by instalments of capital and by sales of treasury stock, amounted to $317,621, and was sufficient to cover the loss and leave a balance of $257,239 to carry forward.

Mohawk Mining Company.

Developments in 1905 included 789 ft. of shaft sinking and 10,023 ft. of drifting on the lode. Stoping amounted to 32,410 fathoms, and 659,291 tons of ore were hoisted; of this, 72,986 tons, or 11.06 per cent., was discarded, leaving 586,305 tons to be stamped. This yielded 12,577,785 lb. of mineral, containing 9,387,614 lb. of fine copper, or 16.01 lb. per ton of ore treated. Cost of production per ton of ore treated was $1.38; the cost per lb. of fine copper included these items: Mining and milling, 8.65c.; smelting, freight and marketing, 1.12c.; construction, 1.14c.; total, 10.91c. per pound.

Operating expenses are given in creditable detail. On the basis of ore stamped, the costs per ton were as follows: Underground expenses—mining, $0.492; timbering, tramming and labor, $0.229; hoisting and pumping, $0.046; power drills, $0.069; supplies and electric light, $0.053; total underground, $0.889; surface expenses, less rents, $0.086; rock house, $0.068; transportation, $0.136; stamping, $0.205; construction and purchase of timber land, $0.225; smelting, freight and marketing, $0.161; office and general expenses, $0.018; total, $1.788 per ton of ore stamped.

Sales of copper during 1905, at 15.53c. per lb., brought in $1,457,588, and interest, etc., added $2998, making total income $1,460,586. Working expenses were $916,726 and $131,687 was spent for construction and the acquisition of timber land, leaving a net profit for the year of $412,173. Out of this a dividend of $200,000 was paid, carrying forward a balance of $596,114, including that brought over from previous years.

Atlantic Mining Company.

The report of this Michigan copper producer, covering the calendar year 1905, is to be commended for giving in greater detail than is the practice of the majority of the companies in the same region, its data on cost of mining and milling. Output during 1904 was curtailed by the temporary stoppage of shafts B and D. Development is being driven with increased vigor, having amounted to 7790 ft. of drifts, as compared with 4910 ft. in 1904. This is a result of the change instituted in the mining system, whereby the levels will now be driven to the limits of the property and stoping will begin at the outward ends, retreating toward the shaft. This change is also reflected in a decreased output from stoping, viz.; 17,812 cu. fathoms, as against 22,009 cu. fathoms in 1904. The benefits of the change are expected in ful-

ler measure as soon as a larger number of the levels have reached their extent. The result of the development has been to show that the central portion of the property is the richest; the copper yield has steadily improved as the extreme northern and southern workings have been relinquished. Exploration for the purpose of locating the Baltic lode on the Atlantic property in section 16 is being pushed.

The year's results may be summarized thus:

Ground broken, cu. fathoms	19,229
Rock stamped, tons	295,220
Mineral recovered, lb.	5,475,704
Fine copper recovered, lb.	4,049,731
Yield of copper per ton rock stamped, lb.	13.63
Value of copper per ton rock stamped	$2.1760
Cost per ton rock stamped; for:	
Mining, sorting, surface expenses and taxes	$1.3400
Transportation to mill	0.0760
Stamping and separating	0.3189
Freight, smelting and marketing	0.1704
Construction	0 0540
Total expenditure	$1.9593
Profit per ton rock stamped	$0.2157

A number of improvements in the milling process and equipment were made within the year. The round tables with heads Nos. 4 and 5 have been replaced by Overstrom tables, as have also the finisher jigs of head No. 4. The mortar screens have been altered from ⅓x⅜ in. to 1/10x ⅜ in., resulting in an increased cost for stamping, but also a more complete recovery of copper. Shipments of mineral to the smelter are now made in steel cars instead of in barrels, as heretofore, a new mineral bin having been built from which to load the cars.

Operating expenses for 1905 are given below, in totals and in cents per pound of fine copper recovered:

	Total.	Per Lb
Copper output—4,049,731 lb.	$642,306	15.86c.
Underground expenses	$319,975	7.90c.
Surface expenses, less rents	75,400	1.86
Railroad expenses, less receipts	22,497	0.55
Stamp mill expenses	94,153	2.33
Smelting, freight, etc	50,322	1.24
Construction and exploration	15,096	0.37
Total expenses	$577,443	14.25c.
Profit for the year	$ 64,863	1.61c.
Balance brought forward	300,357	
Surplus	$365,220	

No dividend was declared from the profits of the year. Since its organization the Atlantic company has distributed $990,000 to its stockholders out of $16,156,100 of gross receipts, or $1,355,220 of net earnings.

Allouez Mining Company.

This company made its first profitable showing in 1905. The Kearsarge lode was cut at the middle of February, 1905, and milling of mineral, with one stamp at the Centennial mill, working half time, was begun on the first of August. During the remaining five months of the year, 1,167,957 lb. of copper was produced and sold at an average of 16.671c. per lb., making a net profit, over all expenses of every nature during that same period, of $19,143.

Of the 38,891 tons of ore hoisted, 2666 tons were discarded and 36,225 tons were milled, together with 4,895 tons from the stock pile, a total of 41,120 tons stamped. This yielded 1,843,620 lb. of mineral containing 63.351 per cent. of fine copper, the percentage of mineral in ore being 2.242 and of fine copper in ore, 1.420 per cent.

The company's working costs are itemized in detail. On the basis of the ore stamped, including that taken from stock pile, the underground costs per ton comprised: Mining, $1.204; timbermen and mechanics, $0.209; trammers, $0.213; labor, $0.414; supplies, teaming and electric lights, $0.595; air compressors and drills, $0.459; hoisting and pumping, $0.818; total underground, $3.912. Further expenses, on the same basis were: Rock house, $0.116; transportation, $0.211; stamping, $0.461; surface and incidental, $0.369; smelting, freight and marketing copper, $0.656; total operating expenses, $5.725 per ton stamped.

Receipts from the sale of copper were $194,719, and from capital instalments and interest, $13,177; total, $207,897. Operating expenses were $223,066, and $87,452 was spent for construction and equipment; total, $310,518, showing a net loss of $102,621 on the year's work, only the last five months of which, however, were productive. The balance brought forward was $189,249, leaving a surplus of $86,628 now on hand.

Horn Silver Mining Company.

The report for the year ending Dec. 31, 1905, shows that this company produced 3,464,007 lb. lead, 6639 lb. copper, 6,035,553 lb. zinc, 104,231 oz. silver and 335 oz. gold. The ore sales aggregated 4733 tons of crude, averaging $12.44 per ton, 8445 tons of first-class zinc ore at $10.87 per ton, 1349 tons lease ore at $13.97 per ton, 5 tons copper ore at $31.12 per ton, and 258 tons concentrate at $13.88 per ton. The total cost of ore extraction was $62,745.31, an average of $3.85 per ton. The concentration costs were $3111.50, or $2.13 per ton, and the ratio of concentration was 5.2:1.

The financial statement compares with 1904 as follows:

	1905.	1904.
Receipts from sales	$174,522	$212,388
Surplus fund	3,873	5,000
Interest	1,183	1,794
House rents	305	552
Gross receipts	$179,883	$219,734
Previous surplus	70,726	51,265
Total	$250,609	$270,999
Op. expenses and charges	114,839	140,273
Net receipts	$135,770	$130,726
Dividends	80,000	60,000
Surplus	$55,770	$70,726

The south 500-level has developed about as anticipated and there is much new ground ahead to be prospected. Orebodies are still being encountered containing the usual percentage of lead, silver and gold, with occasional shoots of copper. Stoping north on the 700-level shows good bodies of lead ore, but so far not much copper. The same conditions prevail on the 700 and 900-levels. It is the intention to prosecute development work on the lower level as soon as sufficient miners can be obtained. Scarcity of miners greatly delayed work during 1905.

Centennial Copper Company.

The production of copper in 1905 was 1,446,584 lb., which was sold at an average of 15.908c. per lb. The yield of refined copper averaged 17.04c. per ton of rock. The last five months showed a decided improvement in this respect over the previous seven. The sales of copper during these months more than paid expenses, except construction and development. During the year the Centennial shared one stamp with the Allouez, but since Jan. 1 it has had the exclusive use and has been stamping about one-third more rock. On Dec. 31 No. 1 shaft was down 30 ft. below the thirtieth level, and shaft No. 2 had been holed to the twenty-sixth. The treasury showed a balance of $331,779 at the close of the year, as compared with $95,951 in 1904.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ended Apr. 3, 1906.

816,554. ELECTRIC FURNACE.—Anson G. Betts, Troy, N. Y. Filed May 20, 1904.

816,562 and 816,563. MINER'S DRILL.—Clyde C. Cranmer, Athens, Ohio. Filed Mar. 2, 1905.

816,672. COAL-WASHING APPARATUS.—Robert L. Martin, Jr., Pittsburg, Pa., assignor, by direct and mesne assignments, to Pittsburgh Coal Washer Company, Pittsburg, Pa., a Corporation of Pennsylvania. Filed Feb. 4, 1905.

816,707. PROCESS FOR THE MANUFACTURE OF QUARTZ GLASS FROM QUARTZ-SAND, etc. Jacob Bredel, Hochst-on-the-Main, Germany. Filed Sept. 19, 1904.

816,725. MINER'S LAMP.—Edwin D. Hodson, Canton, Ill., assignor of one-half to Benjamin B. Hinkle, Canton, Ill. Filed April 11,, 1905.

816,764. PROCESS OF SMELTING LEAD ORES.—William Valentine and Anson G. Betts, Troy, N. Y. Filed June 15, 1904.

816,772 and 816,773. PROCESS OF SMELTING LEAD SULPHIDE.—Anson G. Betts, Troy, N. Y. Filed May 26, 1905.

816,797. COAL-POCKET.—Frank K. Hoover and Arthur J. Mason, Chicago, Ill. Filed Jan. 29, 1906.

816,877. HOT-BLAST FURNACE.—James M. McClave, Toronto, Ohio. Filed Jan. 21, 1905.

816,918. PROCESS OF MAKING SULPHURIC ACID.—Rudolf Knietsch, Ludwigshafen-on-the-Rhine, Germany, assignor, by mesne assignments, to General Chemical Company, a Corporation of New York.

816,923. MACHINE FOR CUTTING HEADINGS.—Willam A. Lathrop, Wilkesbarre, Pa. Filed Aug. 31, 1903.

816,928. PROCESS OF PRODUCING AMMONIA.—John A Lyons and Edward C. Broadwell, Chicago, Ill. Filed Sept. 2, 1904.

817,099. METALLURGICAL FURNACE.—George H. Benjamin, New York, N. Y. Filed Sept. 18, 1905.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

C. W. Purington, of Denver, is now in Boston.

F. A. Heinze is in Butte, having returned to that camp on April 1.

Stanley Currie, of Los Angeles, Cal., is in Mexico on professional business.

Louis Godda, the well-known Boston inventor, is on a short trip to Mexico.

Gen. A. R. Chaffee, United States Army, is making a prolonged visit to Mexico.

Hans A. Frasch, metallurgical engineer, of New York, was in Toronto recently.

Alfred Sutton has been elected a member of the Geologists' Association, London.

B. Baruch has returned to New York, after a visit to his mining properties in Mexico.

H. H. Claudet, of Rossland, B. C., has been a visitor in New York. He is on his way to London.

Edward W. Parker, of the United States Geological Survey, was in New York last week.

Jesse Knight, Provo, Utah, is examining mines in Oaxaca, Mexico, with the view of investing.

Prof. J. A. Holmes, of the United States Geological Survey, has been a visitor to New York.

C. C. Lastinger, of Robinson & Lastinger, Oaxaca, Mexico, is now in Cincinnati, O., on business.

Charles H. Hoffman, a mining engineer of Velardena, Mexico, was in Utah recently on professional business.

A. J. Shores, chief attorney for the Amalgamated Copper Company, has returned from New York to Butte.

G. F. Bryant has been appointed superintendent of the Charlotte Consolidated Mines, Moorlort, Victoria, Australia.

W. M. Courtis, of Detroit, Mich., who is largely interested in Cobalt mining propositions, was in Toronto this week.

T. G. Madgwick has left London for Siberia, to take up an appointment on the Orsk goldfields for an English company.

L. R. Tatum, manager of the Banzai Mining Company operating in Gilpin county, Colo., left Denver this week on a visit to eastern cities.

A. J. McMillan, managing director of Le Roi mine, who has been in England for some months, has returned to Rossland, British Columbia.

E. N. Foss, general manager of the B. F. Sturtevant Company, of Boston, sailed March 17 for the Mediterranean, to be absent two or three months.

C. B. Lewis, president of the National Metal Company, of Mexico and New York, has returned to New York, after a number of months in Mexico.

Alfred F. Leopold, manager of the property of the Butte Copper Exploration Company, spent a few days in Butte early in the month. He lives in Chicago.

E. L. White, president of the Bingham Consolidated Mining & Smelting Company, is inspecting properties of that corporation in Utah.

J. W. Pirscher, former general manager of the Michoacan Railway and Mining Company, has taken the management of the San Rafael El Grande, Zacatecas, Mexico.

David Cole, mill superintendent of the Cananea Consolidated Copper Company, of Mexico, has been studying mill methods as practiced at Bingham and Park City, Utah.

H. A. Prosser, metallurgical director of the United States Smelting, Refining and Mining Company, has been making an inspection of the Utah and California smelters of that corporation.

Leonard D. Sivyer, of Los Angeles, Cal., has finished the examination of mines at White Hills and Chloride, Arizona; and is now inspecting property in the Tonopah district in Nevada.

W. J. Francis, engineer of the hydraulic lift works on the Trent canal in Canada, has resigned to accept the position of manager of a large power development company in British Columbia.

Arthur Laughton has resigned his position as superintendent of the Zavalita Gold Mines, Oaxaca, Mexico, to accept the management of the Chicago & Mexico Mining Company's property near Taxco, Mexico.

C. W. Bowden, of Montreal, lately chief draftsman to the Locomotive and Machine Company of that city, has been appointed designing engineer to the Canadian Department of Railways and Canals.

J. A. Owenby, of Boulder, Colo., returned after a month's trip to New York and other eastern points, and is reported to have succeeded in raising money for a large coal-mining scheme in Las Animas, Colorado.

James E. Jopling, mining engineer for the Cleveland-Cliffs Iron Company, Ishpeming, Michigan, was visiting the mines of Platteville and looking over some drilling prospects near Cuba City, Wis., recently.

J. W. Malcolmson, of El Paso, has gone to London, England, by way of New York, in the interests of the Michoacan Railway and Mining Company of Mexico, of which he has recently been appointed consulting engineer.

A. F. Holden, managing director of the United States Smelting, Refining and Mining Company, is inspecting the Utah interests of that corporation and will visit the Mammoth mine and smelter in Shasta county, Cal., before returning East.

Brig.-Gen. J. M. Califf, U.S.A., for a number of years past connected with the Artillery Corps, visited the JOURNAL office last week and made a careful inspection of the printing plant. General Califf has had much to do with the introduction of electric machinery in the newer forts on the Atlantic coast.

A. J. Ralston, for a number of years president of the Selby Smelting and Lead Company, of San Francisco, has retired and will take a well earned rest. He is succeeded by Henry B. Underhill, Jr., who has been connected with the company for 25 years, as secretary and afterward first vice-president. Charles J. Durbrow succeeds Mr. Underhill as secretary.

A party comprising W. A. Paine, C. H. Paine, William B. McKeever, W. L. Amster, A. B. Clough, George H. Flint, N. Bruce McKelvie, J. W. Burdick and Dr. E. A. Shorey, all of Boston, except the latter, spent two days in Butte recently, arriving there April 2 and leaving April 4. The gentlemen had been visiting various mining districts in Arizona, Utah and Montana.

Willard S. Morse left Aguascalientes, Mexico, April 1. In connection with his departure the following order has been issued by the American Smelting and Refining Company: "Owing to the fact that Willard S. Morse, general manager of the Southern Department, is shortly to leave the country for a somewhat prolonged absence, the executive committee gives notice that, effective on and after his departure from Aguascalientes, the affairs of the Southern Department will be placed under the jurisdiction of a committee to be known as the Southern Department Executive Committee, the members of which will be William C. Potter, chairman, Edward C. Knight and T. S. Austin; the headquarters of the department and the committee continuing to be at Aguascalientes. This committee will, during the absence of Mr. Morse, exercise all the powers of general manager of the Southern Department."

Obituary.

Joseph Monier died in Paris, March 13, at the age of 83 years. Although not the inventor of reinforced concrete, he was the earliest to apply this method successfully to large structures. His processes have been patented in nearly every civilized country. In the United States particularly, engineers have been quick to recognize the merits of his designs, and many notable Monier arches have been erected.

James F. Rodgers, president of the Lanyon Zinc Company, died at New York, April 8, of Bright's disease. He had been suffering for several months and came to

New York for the benefit of the change. He was 59 years old. Mr. Rodgers became president of the Lanyon Zinc Company upon its organization in 1899. Previous to that time he had been engaged in manufacturing business at Toledo, Ohio, but had not been identified with metallurgical enterprises. After occupying the presidency of the Lanyon Zinc Company for several years he retired, being succeeded by F. A. Drake, but upon the resignation of Mr. Drake in 1904 Mr. Rodgers was again appointed to the presidency. He left a widow and four children, three of whom are daughters. His son, James O. Rodgers, is the general superintendent of the Lanyon Zinc Company.

John Christian Kafer, past president of the Engineers' Club, died at Trenton, N. J., on March 30 quite suddenly, although he had been in poor health for some time. He was born in Trenton, 1842. The outbreak of the Civil War found Mr. Kafer in the prosecutionof enginering studies and work, and in 1863 he was appointed third assistant engineer in the navy, continuing in the service until 1885. One of the principal episodes in his life was his term of service at the Naval Academy, including two tours of duty from 1868 to 1874 and from 1878 to 1882. In 1885 Mr. Kafer declined the professorship of mechanical engineering at Cornell University, and a little later he became associated with the Morgan Iron Works of New York City, serving as vice-president, superintendent, secretary and treasurer. He then became connected with the Quintard Iron Works, and within the past month had organized the consulting firm of Kafer, Mattice & Warren. Mr. Kafer was one of the most active members of the Engineers' Club from its foundation, serving for years as vice-president and chairman of the House Committee and as president from 1901 to 1904. He also served as a member of the board of managers of the American Society of Mechanical Engineers, of which he had also been vice-president.

Societies and Technical Schools.

Mexican Chamber of Mines—A circular issued by the Junta Central de Mineros, calls a meeting, to be held in the City of Mexico, May 15. The object of this meeting will be to constitute a chamber of mines which will concern itself in promoting all measures that may be favorable to the development of mining and to serve as the miners' organ in their relations with the federal and local governments as well as with congresses or societies either at home or abroad which desire to enter into relations with the mining men of the republic. In order to be entitled to attend the meeting it will suffice to be a mining man, in the capacity either of mine owner or of manager, partner, caretaker or participant in any mining or metallurgical concern established in the country; and if the person having these qualifications cannot attend personally, he may designate someone to represent him, for which purpose a simple private letter addressed to the secretary will suffice.

Harvard Mining Club—At the meeting of this club in Cambridge, Mass., March 22, Dr. N. S. Shaler, dean of the Lawrence Scientific School, Harvard University, addressed the club on "The Place of a Mining Engineer." He pointed out the need of the mining engineer acquiring a wide knowledge of engineering, geology, and chemistry. He showed how a knowledge of geology often led to a correct interpretation of structure, which has misled others. He laid special stress on the importance of acquiring the ability to manage men. To this end, the health of the men, their living quarters, and especially their care during sickness, and the welfare of the family after death, should be considered.

Trade Catalogs.

Receipt is acknowledged of the following catalogs and circulars:

Stanley-G. I. Electric Manufacturing Company, Pittsfield, Mass. Bulletin No. 147, S. K. C. System; Pp. 16, illustrated; paper, 8 by 11 in. Dec. 1905.

Pacific Metal Extraction Company, 313 Columbia building, Portland, .Ore Booklet. The M. DeKeyser Process of Metal Extraction; Pp. 12; paper, 4 by 9 inches.

Du Pont Company, Wilmington, Del. Booklet, Thawing Dynamite; Pp. 8, illustrated; paper, 4 by 9 in. Booklet, Nyalite; Pp. 8, illustrated; paper, 4 by 6 in.

Harbison-Walker Refractories Company, Farmer's Bank building, Pittsburg, Pa. Booklet, A little talk on brick for boiler settings; Pp. 15, illustrated; paper, 4 by 6 in.

Industrials.

The time for receiving bids for 30,000 tons of cast-iron water pipe for New York city has been extended to April 18, on acount of an error in the original specifications.

The Buffalo Forge Company, of Buffalo, N. Y., report the sixth order received within a short time from the agents in Yokohoma, this particular one being for a Buffalo automatic engine to be used in direct connection with a generator in an electric lighting plant.

The Blaisdell Company, of Los Angeles, California, has recently closed a contract with the Compañía Minera Los Dos Estrellas, Mexico, for the equipment of its new 120-stamp mill (El Cedro) with the machinery required for the Blaisdell system of handling cyanide sand. The Dos Estrellas plant is near the 100-stamp mill of the El Oro Mining and Railway Company, in the cyanide plant of which the Blaisdell system has been in operation for a year.

The Colorado Iron Works Company, of Denver, Colorado, recently entered an order for a 100-ton concentrating mill complete erected for the Mowry Mines Company, Patagonia, Arizona. The equipment includes Colorado Iron Works standard rolls, impact screens, simplex tables, vanners, spitzkasten and settling cones. This company also reports the sale of impact screens to the Annie Laurie Mining Company, Kimberly Utah; Mine La Motte Development Company, Missouri; Bertha Mineral Company, Pulaski, Virginia; Hermosa Copper Company, Hanover, N. M., and bullion cars to the Great Western Ore Purchasing and Reduction Company, Keeler, California.

Construction News.

Hill City, South Dakota—The J. R. Mining Company is considering the installation of a stamp-mill. Address at Hill City.

Vallecita, California—It is proposed to put in a hoist, compressor and small stamp-mill at the Red Hill mine. Chas. D. Smyth, Angels, Cal., is owner.

Angels, California—The Essex Consolidated Mining Company is about to build a tramway 1000 ft. long. M. A. Lathrop, Angels, Calaveras county, Cal., is superintendent.

Hornitos, Mariposa County, California—An electric plant is to be installed at the old Grimshaw mine, near Hornitos. William Casey, of San Francisco, is owner.

Meteor, Ferry County, Washington—The Orion Mining Company contemplates establishing a concentrating plant. C. Shumaker, C. A. Ray and J. W. Bartleft are large stockholders.

Orient, Washington—First Thought Gold Mines, is figuring on an aërial tramway about 2 miles in length, from the First Thought mine in Stevens county, Wash., across Kettle River, to the Washington and Great Northern Railway at Orient, Ferry county. Address Patrick Burns & Co., Nelson, B. C., or Alex Sharp, manager, Orient, Ferry county, Washington.

Bingham Cañon, Utah—The Utah Copper Company has decided to equip its mines immediately with facilities for the treatment of 6000 tons of ore daily. The power plant and storehouse are practically under cover and material is arriving for the first section of the new concentrator building. Contracts for the equipment for this section are being let and are to be followed with that required for the second section. The two sections of the mill are to contain 1132 concentrating machines. D. C. Jackling, of Salt Lake City, is general manager.

Special Correspondence.

San Francisco. April 6.

The Grass Valley miners' union is agitating the question of backing car-men and shovelers in a demand for an increase of pay in that district. These two classes of workmen are generally boys and men along in years unfit for harder work. No decision has yet been reached by the union, though at the first meeting the required two-thirds vote in advocacy of the resolution was not obtained. It is understood that some of the larger mines will close if the proposed demands are enforced. It will be very difficult to force these rich companies into anything of the kind against their will. The miners in the union are by no means all in accord on the subject.

The original plans for the smelting plant of the Balaklala Copper Company of Shasta county have been modified, as the ores are to be reduced to matte which will be shipped to the smelter of the Guggenheims, shortly to be erected at Point San Bruno, San Francisco Bay. When the new Balaklala plant is finished it will have a capacity of 750 tons of ore daily from the mine and will also be able to handle custom ores of that region.

The old Dunlap silver mine near Silverado, Orange county, is being worked again, for the first time in 20 years, under management of Chas. D. Maze, who has 20 men employed. The ore is being concentrated. There has heretofore been difficulty about water supply, but the installation of a pumping plant recently has overcome this.

Between 1870 and 1880 Cerro Gordo, in Inyo county, was a very lively camp and numbers of mines were being worked, but for long years the properties have been almost entirely idle. The new reduction works of the Great Western Ore Purchasing and Reduction Company at Keeler will now handle the ores of the Union, San Felipe, Jefferson, Enterprise and Santa Maria, all former producers.

Some weeks ago suit was begun in Los Angeles against ex-Gov. H. H. Markham for an accounting of funds, the plaintiffs in the case being the stockholders in the American Boy Mining Company, practically all of whom are leading men of Pasadena. Governor Markham is president of the American Boy and the American Girl mining companies, the stockholders of both companies being very nearly the same, although the stock and business management is kept separate. It is alleged that the president of the companies made use of some $25,000 of funds belonging to the American Boy Company in paying the bills of the other company. Efforts at settlement failed and the courts were called upon to straighten out the matter. The case has never been before the courts until now, and an interesting contest is promised, which will be discussed on May 21.

The Selby Smelting and Lead Company, in its answer to the suit instituted by Solano county, denies that injurious smoke, gas or fumes from its plant drift from the smelter to or upon Benicia or any part of Solano county. The company asserts that the fumes are not poisonous or damaging to vegetable or animal life.

Trouble is brewing in Angels camp between the Angels Mining Company, James V. Coleman, owner, and the adjoining Lightner Mining Company, Alex. Chalmers, manager. Mr. Coleman is of opinion that the Lightner miners have been taking ore from ground belonging to him.

The Secretary of the Interior has awarded a contract to the Pacific Portland Cement Company of San Francisco for supplying from 600 to 10,000 bbl. of portland cement for the Klamath reclamation project, at $1.55 per barrel, f.o.b. at the mill at Tolenas, Cal., this bid being the lowest, freight rates considered.

The bill introduced by Congressman Gillett, appropriating $200,000 for a preliminary examination and survey of lands appertaining to the Sacramento and San Joaquin rivers, is the first necessary step toward the great scheme suggested in the report of C. E. Grunsky to the director of the Geological Survey. The California Miners' Association, at its annual convention in November last, adopted resolutions asking the President of the United States to secure from the Geological Survey a report on the possibility of reclaiming the swamp and overflowed lands on and near this river, and depositing upon them the accumulated mining debris of said rivers. The President did as he was asked by the miners and Mr. Grunsky's report was the result. The plan of operations suggested by him greatly enlarged the original scope outlined, including both reclamation and irrigation, as well as a final disposal of the mining debris which was to be used to reclaim and fill in the lands. He suggested that the various projects be lumped together as a special scheme, and that the people of California ask Congress for a special revolving fund to carry out the work, the money to be returned in 20 years. The land-owners were to be required to dispose of their reclaimed lands to settlers in small tracts, none to exceed 160 acres.

There were various conflicting interests to be considered, particularly those of the farmers and miners, and the development associations. Finally representatives of these organizations met in this city and adopted a resolution asking the President to call the attention of Congress to the benefits to result from such proposed law, putting Federal authorities in sole charge of the work; authorizing the Secretary of the Interior to make the necessary examinations, and appropriating $200,000 to be immediately available for the purpose. The resolution was sent to the President, the Secretary of the Interior, director of the Geological Survey, to C. E. Grunsky, and to the California Senators and Congressmen. It was signed by A. A. Tregidgo, president of the California Miners' Association, E. H. Benjamin and S. B. Christy, members of the executive committee of the same organization; W. A. Beard, secretary of the Sacramento Development Association; Geo. W. Peltier, president of the Sacramento Drainage Commission; H. K. Johnson, president of the Anti-Debris Association; and Rufus P. Jennings, president of the River Improvement Drainage Association of California. After this strong evidence of harmony between apparently conflicting interests the Gillett bill was introduced. Since then Senator Flint, of California, has introduced a bill which was drawn up by the Geological Survey, providing for a $5,000,000 reclamation plan. Mr. Grunsky's idea is that the total cost will be $40,000,000, but that the land will eventually pay for it.

A most noteworthy feature is that the signature of the respective presidents of the California Miners' Association and the State Anti-Debris Association are appended to the resolution asking for funds for the preliminary examination. A similar instance is not recalled, as these two associations have been for years antagonistic on the subject of hydraulic mining debris. This time, however, it looks as if the damaged land could be made productive and valuable by means of the mining debris itself, so a feeling of harmony prevails, at least at this stage of the proceedings. Miners, farmers and swamp-land men have come together for once in this State with a common object in view.

Tonopah. April 2.

There is great activity in all of the southern Nevada districts. Several strikes have been made lately in new localities. The success of Manhattan has stimulated prospecting farther north, so far with good results. At Round Mountain, which lies about 18 miles north of Manhattan, an exceptionally rich find has been made of ore which carries immense values in coarse gold on the surface. Three years ago location work was done on this very spot, and it is hard to see how the values were overlooked at that time. It is probbably explained by the fact that Nevada prospectors were not in the habit of panning their samples to test them for gold.

At Jefferson cañon, about three miles from Round Mountain, several properties have been sold or bonded. This is an old camp, which shut down in 1874. The values here are principally in silver, but some coarse placer gold has also been found. About 30 miles north of these camps, and almost east of the old town of Austin, a new camp by the name of Milletts has been started. Some good surface assays are obtained here.

East of Tonopah in the Hot Creek and Kawich ranges several prospects are being

actively developed, with encouraging results.

The ore shipments from Tonopah for the week ending March 29 were as follows: Tonopah Mining Company, 1900 tons; Tonopah Extension, 600 tons; Belmont, 560 tons; Montana, 56 tons; Midway, 90 tons; North Star, 32 tons.

The proposed consolidation of the Ohio-Tonopah, West End and McNamara is creating a great deal of interest. Such a consolidation would be a very strong one. Locally considerable doubt is expressed as to whether the McNamara stockholders will consent to it.

The new head-frames at the Montana and the Belmont are rapidly approaching completion. They have been erected over the old frames without interfering with regular hoisting operations. The Tonopah Extension Company has ordered a new 150-h.p. hoisting engine. This will be a direct-acting engine and the first of its kind to be erected in the camp. The new electric hoist at the Mizpah shaft of the Tonopah Mining Company is running successfully. Electric hoists are also in place for use on the Valley View and the Belmont shafts, but are not yet in operation.

The large orebodies opened up in the Belmont have caused a revival of interest in the eastern end of the Tonopah district. Work has been started to develop the group of claims known as the Mizpah Extension group, lying to the east of and adjoining the Belmont ground.

An important consolidation of property on Bonanza Mountain, Bullfrog, is to be voted on next week at a stockholders' meeting. The properties concerned are the Denver, Eclipse and Tramps. It is planned to call the new company the Tramps Consolidated Mining Company. These properties are adjacent and are so situated that they may be economically developed under one management. There seems to be no doubt that the consolidation will be effected.

Butte. April 3.

Amalgamated broke its monthly record on copper production in March, the output being 1,000,000 lb. in excess of any previous months notwithstanding it lost some time at the smelter by cold weather. Had it not been for the cold, the output would have been 1,000,000 lb. greater, making the total between 17,000,000 and 18,000,000 lb. This production includes the treatment of all ores shipped to the plant, which aggregated about 8000 tons a day. Shipments from the company's mines aggregated about 6500 tons a day; the remainder was sent from the North Butte, Clark mines, East Butte and other properties working on a smaller scale. The smelter is not running to capacity because it cannot secure sufficient ore. This is not the fault of the failure of the sub-companies to produce enough, but by reason of the fact that the railroad company is short on cars and cannot transport it fast enough. The railroad has 100 cars coming from the East and as soon as they arrive the difficulty will be overcome. The bins at the mines are full nearly all the time.

Raven Copper cut its main vein last week by way of the 1500-ft. crosscut from the Buffalo. It was 12 ft. at the point of intersection, but since then has widened to 16 ft. in the drifts. The ore is good, averaging 7 per cent. copper, 15 oz. silver and $1.50 gold. The company is now in shape to produce between 200 and 300 tons a day. Prior to the strike it was extracting 50 from the same vein on the 1200 level.

Reins Copper is down 1180 ft. and expects to finish sinking in 20 days. Five weeks will be required to cut a station on the 1200 level and install two pumps. Butte Copper Exploration is sinking below the 400. Butte & London is down 210 ft., and Butte & Bacorn is down 90 ft. with its main shaft and 70 in the other two. Columbus-Butte is sinking and raising in its new three-compartment shaft, and Boston & Montana has finished its new 800-ft. shaft on the Mountain View and 800 ft. of its new four-compartment on the Leonard. It has completed one compartment of the latter to the 1200 and raised out more than 100 ft. of the remaining 400. The new shaft on the Mountain View will be used while the old one is undergoing repairs.

North Butte is crosscutting from the bottom of its present workings to the Berlin group, acquired by the company recently. It is shipping 800 tons of ore a day.

Original Consolidated, a Clark asset, will place its new concentrator and converters in commission April 5. The copper production of this company dropped off materially during the building of the new plant, the total for any month this year not aggregating 1,800,000 lb. Its production in the Butte plant last month was less than 1,000,000 lb., but it is credited with about 700,000 lb. Ore shipments from the company's mines to its own plant have been resumed.

Salt Lake City. April 7.

At the annual election of the board of directors of the Little Bell Mining Company, operating at Park City, Sidney M. Bamberger, Solon Spiro and Herman Bamberger were elected trustees. Solon Spiro is president; Sidney M. Bamberger, vice-president, and Joshua Bean, secretary.

R. T. White, the new manager of the Balaklala copper mine in Shasta county, California, has returned to Salt Lake after a conference with Eastern interests. The report that the plan to build a smelter for this mine had fallen through turns out to be without foundation, any more than that the matte product is to go to the new smelter of the American Smelting and Refining Company near San Francisco. It was the original intention to make blister copper at the Balaklala, but owing to the extensive interests of the Guggenheims, acquired recently, it has been decided to run the metals into a matte instead. The plans drawn some time ago have been discarded entirely and Mr. White is now working on new ones. It has been decided to equip the plant to handle 750 tons of ore daily and to provide also for the treatment of any custom ore sent to it.

The annual report of the Horn Silver Mining Company, released during the present week, shows that the metal output of the mine during 1905 was sold for $173,267; the quantities were 3,464,007 lb. of lead, 6639 lb. of copper, 6,035,553 lb. of zinc, 104,231 oz. of silver, 335 oz. of gold. These metals were extracted from 4733 tons of first-class crude ore of the value of $12.44 per ton; 8445 tons of first-class zinc ore of the value of $10.87 per ton; 1349 tons of lease ore of the value of $13.97 per ton; five tons of first-class copper ore of the value of $31.12 per ton, and 258 tons of concentrate of the value of $13.88 per ton.

The cost of ore extraction was $62,745, or an average of $3.85 per ton; the expense of concentration was $3111, or $2.13 per ton of ore, and the basis was 5.2 tons of ore into one ton of concentrate. Dividends to the amount of $80,000 were paid during the year, while at the close there was $39,416 in cash in the hands of the treasurer; call loans to the amount of $10,000 are outstanding and $6353 worth of supplies are on hand.

The total dividends paid by the mines of Utah during the month of March aggregated $286,500, the contributors and the amounts paid by each being: Daly West, $108,000; Silver King, $100,000; Consolidated Mercur, $25,000; Beck Tunnel, $15,000; Grand Central, $12,500; Victoria, $10,000; Sacramento, $5000; Swansea, $5000; Uncle Sam Consolidated, $5000; Utah (Fish Springs), $1000.

Shipments of copper matte from the White Knob smelter at Mackey, Idaho, are coming to the Salt Lake smelters.

The prospecting of the ground of the Boston Consolidated at Bingham with diamond drills has ceased for the present. In the meantime the management is getting ready to begin stripping the surface with steam shovels, preparatory to putting them to work on ore.

It is understood that the Daly-Judge Mining Company, operating at Park City, will pay off its bonded indebtedness, which amounted to $209,000, at the beginning of the year. On this $40,000 have been paid and the bonds canceled. The treasury of the company now contains enough to pay the rest. The company is realizing from $70,000 to $75,000 per month net at the present time, and no effort is being made to crowd production.

Leadville. April 8.

The opening of a rich body of chloride ore in the Bessie Wilgus, Rock hill, during the week, has again drawn the attention of mining men to this section. For over two years the owners of the property have been searching for the extension of the Reindeer shoot, but so far have failed to locate it. During this time several carloads have been shipped from small pockets of the same grade of ore as found in the Reindeer. A few hundred feet from the end line of the Reindeer in the Wilgus property to the south there was encountered a large roll of lime and this was thoroughly prospected, but without results. Several months ago R. B. Estey, an experienced mine manager, was given charge of the property and he devoted his energies to working at the bottom of the lime roll, and succeeded in locating the present orebody. The shoot is distinctly a separate one from that of the Reindeer, running in a southwesterly direction and not extending to the north; it is situated nearly in the center of the claim and at present is 4 ft. wide, with neither top nor bottom reached. The whole body of ore is heavily spattered with chlorides, and assays have been taken from it that run very high. A carload was sent to the smelter at the end of the week, and from fair samples taken from the whole car it is estimated that it will net $25,000. It is the the richest body of silver-bearing ore opened in the camp since the days of the Robert E. Lee, Chrysolite and Little Pittsburg. To the southwestern side-line the company will have several hundred feet to go before the orebody leaves its ground; the trend of the shoot is toward Iowa gulch.

A few days after the opening of the orebody in the Wilgus the shaft on the Mammoth, Big Evans gulch, penetrated the last ore-shoot, and it was found to be richer than expected. The character of the ore is a lead-sulphide running high in silver and 30 per cent. lead; the whole bottom of the shaft is covered with this high-grade stuff; the shaft has gone down through 7 ft. of it, and the end has not been reached yet. From the results of the diamond drill the shoot should be fully 15 ft. thick. In the opinion of experienced mining men this shoot comes either from Fryer or Carbonate hills, and it is sure to extend north to Canterbury hill. The nearest property to it in ore is the El Paso on Fryer hill, and it is fully half a mile distant in a straight line. The value of the discovery is even more important to the camp than that of the Bessie Wilgus, as it opens up many hundreds of acres of virgin ground for development that has hitherto been considered barren. It also brings the Canterbury hill section more prominently before the mining public as a future proposition of great promise. During the last few feet of sinking, native silver has been found sprinkled all over the ore. Everybody in the country rejoices over the success of the undertaking acquired by Major A. V. Bohn, who was the man who first figured out that ore lay in that section of the camp, and after many drawbacks has brought the undertaking to a successful issue. The Citizens Mining Company has a lease on the ground for 10 years; the bulk of the stockholders are in St. Louis.

The Ida May in the Lake Park creek district has opened a body of ore 3 ft. wide that runs well in silver, with some gold. The shaft was sunk to a depth of 70 ft., when a drift was started into the hill on the vein and driven 40 ft. when the ore was struck.

In the downtown section the drift from the Penrose to the Coronado has reached under Seventh street and to the angle, where the turn will be made direct to the Coronado shaft. A flow of water amounting to 2700 gal. per minute was encountered at the breast of the drift, and it is being handled easily by the pumps at the Penrose shaft; the water at the Coronado has been reduced to 75 gal. per minute. It is expected that this is the last heavy flow of water that will be encountered in the drift; the whole of the country in this section is now unwatered.

Returns from the first shipment of manganese ore sent from the A. V. shaft, at the foot of Harrison avenue, have been received and are satisfactory. From now on steady shipments will be sent to the steel works at Pueblo.

An English syndicate has taken hold of a project to drive a tunnel from the head of Big Evans gulch through Mosquito range, to come out on the Park county side a little south of Alma. The money has been furnished for the preliminary surveys, which are now being made. The projected tunnel will cut under the London mine about 2000 ft. deep. This tunnel is independent of the one to be driven through the range from the head of Empire gulch.

The shipments for the month of March reached 76,000 tons, a slight falling off from the regular amount, caused by bad roads, too much snow and a scarcity of cars to move the product. Until the roads become passable the mines in the outlying districts will have to stack their ore, as at present it is impossible to haul over the roads.

Breckenridge, Colo. April 3.

There have been several strikes of great importance in the Frisco camp within the last week. Albert Newton, who is developing a group of claims on the southeastern side of the Masontown property has unearthed some rich float. It comes into his tunnel in the form of quartz carrying free gold very thickly. On the Royal group, on the north of the Masontown property, Linquist & Heckman have got rich sylvanite float.

The Masontown Company is arranging to sink the main shaft and prospect for the vein which has shed this rich rock and is also intending to work the rich sulphide ores which are opened up in the lowest level.

The Mary Verna Mining Company's main tunnel is now in 740 ft. The North American Mines Company is pushing ahead on the tunnel into Peak I of the Ten Mile range. This is now in over 1000 ft. The work of drifting on the large orebody just passed through has been discontinued temporarily.

The Square Deal Mining and Development Company is taking out a shipment of high-grade ore to be sent to the smelter and also a quantity of lower-grade ore to have a mill-run made at the Denver Ore Testing and Sampling Works. The main tunnel is now in 360 feet.

At Breckenridge the main tunnel of the Old Union Mining and Milling Company has intersected the Old Union vein, 125 ft. below the upper workings, and between No. 1 and No. 2 shafts. This vein is 75 ft. from the Union vein, along which the main tunnel was driven, and which showed up good ore for over 1000 ft. The water in the old workings will be taken out prior to making connection on the ore.

A lease has been secured by local operators on the Sultana group of mines in the Yuba Dam flats on the Blue river. This property is owned by St. Louis people, who have not operated it for several years. It has a record of production for silver, lead and zinc.

In the Country Boy mine on Nigger hill the Lanyon Zinc Company has excellent showings. There is a 2-ft. streak of 45 per cent. zinc ore now showing in the drift. Another car-load shipment has just been made and more will follow.

The lessees of the Germania mine have just shipped another car of high-grade silver ore. The lower grade is being sent regularly to the market.

The Colorado & Wyoming Development Company has made a contract with the Old Union Company to deliver 2000 tons of its dump ore from the Wellington mine for treatment at the Old Union mill.

Cripple Creek. April 7.

The large shaft-house and hoisting plant at shaft No. 1 of the Portland mine was burned to the ground last week. The ore-house and a number of other buildings of the company were also destroyed. The fire occurred at night and originated in the fuse and cap room. One man only was injured. The loss is estimated at about $100,000, and it is understood that it is fully insured. Work has already begun clearing the ground of the debris. A new plant will be installed at once. This will make but little difference in the output of the mine, as a third shaft has been put on at No. 2 shaft, from which most of the ore has been hoisted.

A lease has been granted by receiver A. W. Grant, to Prettyman and associates on the old mill of the Homestake Mining and Reduction Company. A lease has also been given on part of the property.

A water-course was cut a few days ago on the 1000-ft. level of El Paso, which caused the workings to fill up to the 600-ft. level, thus stopping all work on the lower level. The management states that the striking of the water will only cause a small part of the force to be laid off. The 600-ft. level is the one that is cut by the present drainage tunnel. It is not known just what will be the future policy of this company. If the present flow of water does not abate, it will be impossible to resume operation on the lower levels until the new drainage tunnel is completed.

At a meeting of the stockholders of the Mary McKinney Mining Company, the consolidation with the Anaconda Gold Mining Company, was ratified. The basis of consolidation was the same as has been talked of for some time past. The drainage of the lower levels of El Paso has revived the talk of the new drainage tunnel. A number of mining men think that the time is ripe for the commencement of the new tunnel. So far, however, nothing definite has been done.

Socorro, N. M. April 6.

San Miguel county is now attracting notice. The sandstones of the Tecolate district are impregnated in places with copper and two small mills have been erected to develop a commercial method of leaching out the metal, to see if these extensive and easily mined deposits can not be utilized. Copper, associated with iron, also occurs in the Rociada region. There is one 50-ton mill, and Gov. O. A. Hadley has made a good showing on the Last Chance group, while the Azure, the Joe and Jennie and the Lone Star have been considerably developed.

Sixteen miles west of Las Vegas is the Mineral Hill district, in which the Blake Mining and Milling Company hopes to start a leaching mill soon on the copper carbonates contained in the Copper King. Santa Maria and Mystic groups. At Hamilton camp, the Pecos River Mining Company has 40 men on mine development to block out enough ore to warrant the building of a large concentrator.

At San Geronimo occurs some fine marble, which might have been developed before this, had it not been on the Las Vegas land grant. Fine blue limestone and white sandstone are also plentiful in this region. A charter has recently been secured by Colorado capitalists for a narrow-gage railroad to run from Las Vegas north to Mora and Taos. Projected principally for lumbering, it cannot fail to be of use also in developing the mining districts along its line.

Joplin, Mo. April 10.

The Chapel Mining Company of Carthage has filed articles of incorporation, with a capital stock of $150,000. The stock is held by J. P. Newell, S. F. B. Morse, G. W. Shelton, H. W. Blair.

The Paola-Joplin Mining Company of Joplin has filed articles of incorporation, with a capital stock of $50,000. The stockholders are J. J. Pullen, C. E. Yates, C. C. Nicholas, C. G. Gartner, Frank Ruddy, J. F. Donahoo.

The Spring River No. 1 Mining Company, composed of Mayor Geo. W. Moore, M. R. Lively and others of Webb City has developed a big producer on the Acme Mining Company's land, northeast of Joplin. It promises to be one of the best in that part of the district.

A company of Carthage parties who recently took a lease on 40 acres of the Davis & Stevenson land, 14 miles east of Carthage, are elated over a discovery of zinc ore in a shaft they are sinking, at a depth of 15 ft. The extent of the orebody is not known yet.

The Double Dick Mining Company, operating south of Duenweg, has opened up a promising lead and zinc prospect. The ore was encountered at a depth of 80 ft. and they are taking out chunks of lead weighing from 100 to 200 pounds.

Pate & Co., who recently took a lease on J. A. C. Mining Company's lease of the Robertson land, southeast of the city, have encountered rich lead dirt at a depth of 103 feet.

Thos. Conner and Nap Perry, of Joplin, and George B. Flournoy, of Webb City, have purchased the Carter farm of 262 acres on Center creek, northeast of Webb City, consideration $19,650. Two drill holes on the land show a good face of sheet ore.

The Keller Mining Company, operating on the Rob Roy land, this week encountered a rich run of zinc ore at a depth of 70 feet.

Pierson Bros., of Joplin, who have been drilling on a lease lying about two miles east of Joplin, have encountered a good face of zinc ore.

Platteville, Wis. April 5.

A strike that means much to the Platteville camp is the one reported by the Empire Mining Company. It is about one mile from the present workings. A new concentrating plant will be necessary to take care of the new range when it is developed. The Empire directors hold a meeting to consider the advisability of erecting a roasting and magnetic separating plant, as the ore encountered in the lower run carries from 14 to 15 per cent. iron pyrites.

At a stockholders' meeting of the Standard Lead and Zinc Company, held in Milwaukee, an entirely new board of directors was elected.

The installation of the power and pumping plant at the Acme is about completed. It consists of an 80-h.p. boiler and two 10-in. Cornish crosshead pumps built on the Galena pattern.

Some new territory is being opened in the vicinity of Menominee. Some traces of zinc and lead have been found.

One of the most important of the new strikes is that recently reported at the Rice Creek mine, near Galena camp; at 50 ft. extremely rich blende was encountered. The property is controlled by parties from Minnesota.

The lease recently located by Heer & Harney is reported to be developing well. An average sample of the ore taken out assays high. Some lead ore has been taken out in cleaning up the shaft and sinking the sump. Improved machinery has been erected at the main shaft.

Mining interest in the vicinity of Dubuque has increased materially during the last few months, owing to the success of the mines in the Platteville district. Formerly Dubuque was a lead market.

Messrs. Coats, Bonson and Wales have organized the Avenue Top Mining Company. The main shaft is located in the center of a residence block on one of the numerous hills that surround Dubuque. The shaft is 160 ft. deep. In connection with the proposed installation it is expected that the water will be pumped to the 100-ft. level, at which point there is an adit.

A feature peculiar to the mines around the Dubuque camp is that the ore is confined to vertical sheets lying next to vertical crevices. It is possible to shoot out the ore without disturbing very much of the dead ground.

The high water in the vicinity of the Galena camp last week backed up from the river and filled the Black Jack mine. At the time of the flood the mine was nearly unwatered after weeks of hard pumping. It is hard to tell when the water will be out again.

The Empire Mining Company has closed a contract with the Galena Iron Works Company for a Galena type roaster to be used in connection with a Cleveland-Knowles machine. The building is to be built entirely of steel for safety from fire. The new plant will contain several innovations that have been recently perfected. The operations will be automatic from the time the ore leaves the concentrating plant until it is dumped into the ore bins, as finished heads. The contractors have agreed to have the plant in operation by the middle of May.

The Galena type roaster at the Gritty Six is about completed, as is also the new one at the B. & C., near Shullsburg.

The Sunset mine, near Rewey camp, promises to be a good producer. The test run on the new mill gave good results. The ore is rich, running about 30 per cent. jack. The owners report more than three months' run broken and stored in the

ground, with a working face of sufficient extent to enable the drillers to break enough dirt each day to keep the mill going. During the four days' test run over $1500 worth of zinc concentrates was cleaned up. The Sunset lies between the Sunrise and Coker mines that have been operating for a number of years. The Coker reports the coming in of a 5-in. solid sheet of zinc ore, which was located by a diamond drill last summer.

Calumet, Mich. April 10.

An engineering party employed by the Keweenaw Copper Company is at work in Keweenaw county extending a preliminary survey of the line of the Keweenaw Central railroad to the mouth of the Montreal river. This will carry the line 12 miles beyond the eastern point reached by the grading last fall, at the Medora property. It is not known whether the road will be extended this year.

A. H. Sawyer, engineer at the Michigan and Adventure mines in Ontonagon county, has resigned to accept charge of the diamond-drill work on the properties of the Keweenaw Copper Company. Carl Forbes, formerly mining engineer at the Victoria, succeeds Mr. Sawyer at the Michigan and Adventure mines. Engineer W. W. Stockley of the Keweenaw will hereafter confine his entire attention to the construction of the railway.

Electricity is being rapidly introduced as a motive power at Lake Superior copper mines. Within a short time all of the rockhouses at the Calumet & Hecla company's workings on the Calumet conglomerate, Kearsarge amygdaloid and Osceola amygdaloid beds will be equipped with motors and electricity will supplant steam as the motive power. At No. 2 shaft of the Calumet branch the current has been turned on for several weeks. No. 4 shaft, adjoining, will receive the current in a few days. A number of other rockhouses are equipped and the transformation is being made as conditions permit.

Preparations for the introduction of electricity in the carpenter and blacksmith shops of the Calumet & Hecla mine are practically completed. In the rockhouses the electricity is used for operating the rock breakers, trip hammers, etc., by means of a 50-h.p. induction motor. It is planned to operate the hoisting plants, pumps, etc., by electricity. Electric pumps are already used to a limited extent in the mine.

A survey is being made for an electric transmission line from the Champion to the Trimountain mine, and the latter will soon have electric power for use on surface to a limited extent. At the Champion a generator is being installed at shaft F, with a capacity of 250 kilowatts. It is manufactured by the General Electric Company. An Allis-Chalmers direct-connected, cross-compound, vertical engine will furnish power. The generator will furnish sufficient power for the operation of the machinery in the blacksmith, machine and carpenter shops about the mine The Champion has used electricity as a motive power at its shops for some time, another generator being in service. The new generator will permit the extension of electric power to all pumps in commission on surface from which water for domestic and other purposes is secured, and to a limited extent to the underground pumps. At the Trimountain it is purposed to use electricity for some of the shop motors, surface water supply pumps and eventually for pumping in the mine.

There are facilities available for a limited increase in the volume of rock shipments to the Baltic's stamp mill, and the beginning of production from No. 2 shaft six weeks hence will be reflected in a larger copper production. It will not be possible to make a large gain, however, until the two-head addition to the mill is partly in commission.

There has been a material improvement in the character of the ground in which the drills are working at the Trimountain in the last few weeks. No. 1 shaft is opening productive ground in its drifts northward at the lower levels.

At the Lake Copper company's property in Ontonagon county the exploratory work is advancing steadily. Sinking in the shaft on the Knowlton lode is under way at a depth of 375 ft. A diamond drill will be rigged up as soon as the sand-pipe penetrates the overburden.

Birmingham. April 9.

Positive announcement was made during the past week by John A. Topping, president of the Republic Iron and Steel Company and chairman of the board of directors of the Tennessee Coal, Iron and Railroad Company, that there would be no change in the attitude of the management at the coal mines of the companies named; and that all employees may rest assured that they would be protected and would be allowed to enjoy all rights under existing contracts. This was given to mean that the open-shop policy begun nearly two years ago would be continued. Since the election of Mr. Topping many rumors have prevailed that the new executive would bring about a change of conditions and would terminate the strike of the union coal miners, which began in the Alabama mines in July, 1904. When questioned in this regard, Mr. Topping gave out the statement mentioned in definite and positive terms. This formal announcement dashed cold water on the hopes of the union miner leaders, who held out a prospect that their troubles would come to an end. The national organization of the United Mine Workers of America has spent thousands of dollars on the strike in this State. The strike is at the mines of the furnace companies chiefly. Almost all independent coal companies in Jefferson county have contracts with the union.

Scranton. April 10.

To an observer in the anthracite country it is evident that conditions are different to those prevailing before the strike of 1902. Then the miners were a unit in remaining from work. They would now obey the strike order to a man, but how long they would remain inactive is a difficult problem. Hence it would resolve itself into a question of endurance between the operator and the miner, or, in other words, a battle for the existence of the union.

There is a widespread feeling among the operators and superintendents that after a week or two the strikers would be ready to return to work with a little encouragement, especially if they realized that nothing would be gained by a long cessation; and that, when they returned, it would be upon the terms first offered by the operators. That the operators are determined to take this stand is evident from the fact that they are now making a canvass of their employees to ascertain the proportion that would be prepared to return to work after a strike has been ordered. They claim that they are satisfied with the results, and that, once a strike is ordered, the proportion of men ready to return, in defiance of the union, will be very large, and that before long all would return. Whether they are taking an optimistic view of the situation, actual experience only will decide; but they appear to be convinced that they would win in a conflict, should the miners inaugurate one at this time.

To those outside the region it is important to bear in mind that the question of the recognition of the union means that of the "closed" or the "open shop." It is no secret that, whatever may be the pressure, or whatever the source from which it may emanate, the operators will not agree to the closed shop, so far as it concerns the mines. The miners are not making a strong stand upon this issue, realizing that it would be absolutely futile at this time.

As an indication that the operators believe that the men are not prepared to continue the agreement without declaring a strike, they are making every preparation to work the mines with outside labor. That they are in a better position than in 1900 and 1902 is evident.

In the first place, there is no general discontent among the men. They are satisfied with the general conditions which are existing. They have had three years of unsurpassed prosperity. They have saved money, which they are loth to spend during a strike, when they fail to see that the outcome will materially improve their conditions.

In the second place, they realize that

the operators will be in a better position to fight the union, owing to the decision of the Supreme Court in connection with the miners' certificate case, under which it is no longer necessary for a person to serve two years in the anthracite mines before qualifying himself for a certificate. In consequence of this the operators are enabled to secure miners from any other State and are already taking steps to import men. They will not be content to operate washeries alone, but will start up as many collieries as possible, increasing the number according to the number of men that can be secured.

There is a general feeling among the operators that the union has become more and more unreasonable in its demand, and that the time must come when an aggressive stand must be taken. There is a singular unanimity among those who have discussed the situation. It is evident that the very existence of the union has never before been so seriously threatened. Even although a strike has not yet been declared, some of the collieries have been operated. In the Royal Oak colliery, at Shamokin, men have been at work throughout the week. The mine is located in a section which was a hotbed of turbulence during the strike of 1902, when several of the men worked throughout the entire time of suspension. In the present instance they again declared their willingness to work, and the company was not slow to take advantage of the offer. The company is confident that it will be able to work both mine and breaker throughout the strike, if one be declared. In the case of the Oxford colliery, Scranton, which is the only non-union colliery in the anthracite region, the suspension has only resulted in increased activity. This colliery, also, was worked during the last strike, and the owners made a large profit, while all other mines were idle. As soon as the order for cessation was given out, many men applied for work and were taken in as rapidly as chambers could be given them. Day and night shifts were organized and every effort made to cope with the flood of orders from all sources. There were more than 5000 orders from local people alone, when the miners were ordered to quit work a week ago. The proprietors are prepared for a strike and will feed and lodge the men on the premises, if necessary, thus doing away with any possible danger from picketing on the part of the union men.

A new feature of the "cessation" has been the enforcement of the trespass law which was passed at last year's special session of the Legislature. It was enacted mainly in the interest of the farmers and provided that, when notices are posted upon any property, any person found upon such property may be arrested as a trespasser. Notices have been posted freely throughout the region at the mines and yards of the companies, but so accustomed have the men been to frequent these places at all times that they did not realize the importance of the warning until taken before a justice and fined $5 each. Hitherto it was not possible to keep men from the collieries, so that they were at liberty to watch men who went to and from work, and were able to intimidate them. Now, under the new law, they will be compelled to remain on the public thoroughfares and at a safe distance from the collieries.

As a slight indication of the feeling of some of the miners in connection with the threatened strike, it is interesting to note that District President Dettery, of Hazleton, was soundly berated by a miner and his wife, upon his return from New York, for being one of those responsible for the stoppage of work. Dettery was in Hazleton when he was met by the couple—the woman, in a furious temper, and on the public street, using language denouncing the miners' president for causing misery among the people. The husband joined the wife, and quite a scene was caused. There are many miners who feel aggrieved in a similar manner.

One of the unfortunate events of the week was the dynamite outrage at the Franklin colliery of the Lehigh Valley Company, when a steam-pipe line was destroyed. The pipe-line extended from the boiler room to the inside workings to run pumps and a hoisting engine. The force of the explosion tore out a 4-in. steam pipe and crippled the inside workings. There is no doubt but that the outrage was the work of some of the foreigners out of work.

A pleasing feature, on the other hand, is the number of miners who are availing themselves of the period of enforced idleness in preparing to build homes. The three years of prosperity has enabled many of them to purchase lots and to save money toward the building of a home. There are hundreds now excavating the foundations of their homes, believing that they will soon return to work, and that they can proceed with the building undisturbed by a strike.

The mules of the Philadelphia & Reading Company, in the neighborhood of Mahanoy City, have been hoisted to the surface. In a number of other collieries the mules have been placed in a pasture.

In some of the Reading collieries supplies have been received on a large scale. These include food-stuffs, cooking utensils, bedding, etc.; billies for the use of the watchmen have been made, and other arrangements indicating preparations for a strike. Even newspaper men have been strictly excluded from the colliery surroundings.

A serious accident occurred at the Big Mountain colliery a few days ago when, owing to an explosion of one of the boilers, one-half of the boiler house was destroyed. Operations in the mine were resumed last summer after a long suspension, and a large plant had to be operated in order to keep the workings free from water. It is believed that it will now be impossible to prevent the workings being flooded, as two nests of boilers were destroyed and the other two so badly damaged as to be rendered useless. The engine is also disabled. But one man, the fireman in charge, was killed, and with his death the hope of explaining the cause of the explosion is gone.

Since the tunnel recently driven in the Beaver Meadow slope has been completed, four pumps have been dispensed with. The tunnel will drain all the slopes in the Quahake valley.

Charles E. Sayre, formerly claim agent of the Lehigh Valley railroad, has organized the Sayre-Byrne Coal Company.

Francis Critz, chief draftsman of the Philadelphia & Reading Company, has gone to the Lake Superior region for the purpose of studying the methods employed in the operating of the hoists. The company has been in continual trouble with the Mahanoy plane, owing to the machinery frequently giving way. Mr. Critz is to report upon improved methods.

Toronto. April 7.

The first labor difficulty to occur in Cobalt camp took place recently on a small scale. The attempt was made to organize a miners' union; among those who joined being a number of the employees of the Nipissing Mining Company. As soon as the matter came to be known to the company, Mr. Linney, the manager, discharged a miner who had come from Montana and taken a prominent part in the organization, of which he was secretary-treasurer. The men were warned at the same time that the company would not retain any union men in its employment. The leading mine operators have arranged a scale of wages among themselves, as follows: Miners, machine and hammermen, $2.25 per day; underground laborers, $1.75; surface laborers, $1.25, with board in all cases. They have also agreed that they will not employ union men.

Mineral production in the Hastings county mining district has been very active lately. The output of the Canada Corundum Company's mill at Craigmont is about 14 tons per day. The Deloro mispickel mine, which has not been worked for some time, is to be reopened under the stimulus of the increased price of arsenic. The sodalite mine near Bancroft is turning out well, a car of the output recently shipped to Great Britain having netted $30,000. A gold mine on the farm of John Rhodes, fourth concession, Elzevir township, is being operated by Buffalo men. They have sunk a shaft 70 ft. and have a 20-ft. vein which improves on the lower level, the ore assaying at $130 to the ton.

No importance whatever is attached in official circles to the statement that capitalists of Bay City, Mich., having surreptitiously obtained Government maps of

the Gillies timber limit just outside the Cobalt mining area, have explored the entire tract and staked off numerous locations. Hon. Frank Cochrane having had his attention called to those widely circulated reports, stated that even though such proceedings had been taken, it would not entitle those concerned to any sort of preference or consideration when the Government was in a position to deal with the limit, which would not be before Oct. 1. The parties owning the timber have been given until that time to remove it, and the land cannot be thrown open in the meantime. The Government has received numerous applications for locations in the Gillies timber limit from prospectors who hoped in this way to establish a claim in advance of the opening of the area, but in every case the documents have been returned by the Lands and Mines Department to the parties sending them. It is stated that prospectors or speculators have been endeavoring to sell information as regards the deposits of the Gillies limit to Americans. All such information, however, is practically valueless, even if genuine, as Mr. Cochrane states that the method to be adopted in awarding locations, when the tract is opened, will be governed by special regulations, dealing with what is altogether an exceptional case.

The Cobalt Open Call Mining Exchange has been opened at that camp, with H. A. Barber as secretary-treasurer. The first 25 seats applied for were sold at $50 each and the price on the next 25 was placed at $100. The temporary quarters are almost completed and will be formally opened early in April. The Australian system has been adopted, under which evening meetings will be held, at which the public will be permitted to transact business.

Speculation in real estate grows increasingly active, and shares in many of the mining propositions put on the market are rapidly taken up.

Two compressor plants are being installed in the Lake Kerr district on the Drummond and Jacobs mines. The machinery has to be hauled from Argentite station, half-way between Cobalt and Haileybury. The finding of free silver on a prospect 1½ miles from Latchford and near the Montreal river has been confirmed. Assays show smaltite and free silver. C. L. Hanson has purchased the property.

A. H. A. Robinson has been appointed by the Provincial Government permanent mining inspector of the Timiskaming district, and as soon as the ground is clear of snow will make a general inspection, which, it is expected, will result in many claims being disallowed. All winter prospectors have been staking claims, when it was impossible for them to have made actual discoveries.

Considerable attention is being now devoted to the Quebec side of Lake Timiskaming. The old Wright silver mine, six miles south of Haileybury, Ont., and seven miles from Ville Marie, Que., has been sold by its English owners to McMartin Brothers, of La Rose mine, for $50,000. It is a silver lead-property and one of the oldest Canadian silver mines. It has a 38-ft. ledge of lead ore carrying good values. It will be opened up immediately with a force of 50 men.

W. W. B. McInnes, commissioner of the Yukon Territory, is in Ottawa endeavoring to secure from the Government the adoption of what is known as the McInnes mining code. It was framed to give greater stability to the mining laws and more security of title to mine-owners. The amendments to the present regulations are the suggestions of practical men on the spot and conversant with the needs of the mining community. Mr. McInnes regards the prospects for the coming season as decidedly encouraging, as the heavy snowfalls of the past winter will insure a plentiful supply of water, the lack of which last year was the main cause of the decrease in the output.

Lethbridge, Alberta. April 2.

At Lethbridge, southwestern Alberta, the men employed in the coal mines of the Alberta Railway and Irrigation Company and in the Galt coal mines have gone out on strike. More than 500 of the employees joined the union formed here in February. They are reported to have made demands upon the company to the following effect: Provision for the hearing of grievances by the company's officials and pit committee, and, in case of non-agreement, men to be at liberty to stop work if they so desire; access to the mines be given pit committee for purposes of investigation; company to deliver all material to nearest cross-cut to working face; to secure each miner a minimum wage of $3 per shift; to deliver screened coal to workmen at $2.50 per ton; to recognize the union; to retain from wages due employees amounts of orders payable to union officers; contract coal to be weighed before being screened; day's work underground to be eight hours, outside labor 10 hours; miners' wages $3, or in wet places and at rock work, $3.50; of hoisting engineers, $4. The companies declined to accede to these proposals, claiming that their adoption would involve the operation of the mines at a loss. The men thereupon ceased work. The district president of the union is stated to have said that unless an agreement is soon arrived at the strike may be extended to other coal-fields. Meanwhile, with cold weather and but little coal being shipped, the situation may become serious in some places dependent upon Lethbridge for a coal supply, although the needs of the town itself are being met by two mines that have accepted the union's conditions.

Frank B. Smith, inspector of coal mines for Alberta, reports that there are now in this Province some 125 coal mines subject to Government inspection, as compared with only 30 in existence four years ago. Although the output of the mines has increased rapidly, the market for the coal has so extended that while this year's production will probably exceed 1,000,000 tons, it is not expected there will be any difficulty experienced in disposing of this larger output.

The *Frank Paper* states that the International Coal and Coke Company, which commenced to open up its coal measures at Coleman, southwest Alberta, late in 1903, is now mining about 1350 tons of coal per diem. Of this quantity about 200 tons is made into coke and the remainder sold as coal. There is a good demand for the coke made and all of the beehive ovens, 104 in number, are kept in operation. The company's March output of coal is expected to exceed by more than 10,000 tons that of any previous month.

Ore crushing has been commenced at the Canadian Metal Company's zinc smelter at Frank. A considerable quantity of zinc concentrates and crude ore is on hand and preparations are being made to shortly start smelting on a commercial scale. For the time being British Columbia will supply practically all the ore and concentrates these works will smelt.

Victoria, B. C. April 6.

Boundary—According to an estimate made by the Phœnix *Pioneer* there are more than 2000 men employed at the mines and smelters and on the railways of the Boundary district. Of this total the Granby Company employs nearly 800, the Dominion Copper Company about 350, and the British Columbia Copper Company 300, these figures including employees at both mines and smelters. The Canadian Pacific Railway Company finds work for about 300 men on its district branch railway lines, and the Great Northern Railway some 120. A number of small mines together provide employment for between 150 and 200 men. The prospects are that a further increase in the total will take place during the ensuing summer.

The output of ore from Boundary mines for three months to the close of March has totaled approximately 320,000 tons, in the following proportions: Granby Company's mines, 216,500 tons; Dominion Copper Company's mines, 52,500; B. C. Copper Company's mines, 43,200; Oro Denoro mine, 6600; sundry small mines, 1200 tons; total, 320,000 tons.

The usefulness of the diamond drill in mining is recognized by the three companies operating on a large scale in the Boundary. To date the Granby Company has drilled holes totaling between 17,000 and 18,000 ft. for the purpose of determining the extent of known orebodies and prospecting new ground. The B. C. Copper Company during the last twelve months has drilled between 3000 and 4000 ft. in its Mother Lode mine and recently

commenced using the drill in the Emma mine, also in this district. The Dominion Copper Company is preparing to put in a number of drill-holes from the lower levels of its Brooklyn mine at Phœnix. Drills have also been used for prospecting purposes in the Oro Denoro, the Betts and Hesperus mines. Of the five drills in use in the district two or three are owned and operated under contract by the Diamond Drill Contracting Company, of Spokane, Washington, and the others by the respective companies using them. The drilling company mentioned is also operating drills in the Similkameen district.

Mexico. April 9.

Col. W. C. Greene, of the Cananea Consolidated Copper Company, Greene Consolidated Gold Company and the Greene Gold-Silver Company, has just obtained from the Chihuahua State Government a broad and sweeping concession giving him special privileges in the construction and operation of mills, smelters, railroads, etc. With this as a base it is expected that the Greene Gold-Silver Company will increase its capital stock, for the purpose of acquiring more mining land in the Sierra Madres, tributary to the Cananea, Rio Yaqui & Pacific Railroad and the Rio Grande, Sierra Madre & Pacific; extending the same said railroads; and building or buying mills or smelters in the Sierra Madre district. In this connection it is understood that negotiations are already pending for the purchase of the old Federal smelter at El Paso, which was but recently put in repair, together with its copper mines in Peabody, Arizona, as well as of the smelter at Terrazas station, on the Mexican Central, in Chihuahua. This latter plant is the property of Juan Creel, of Chihuahua, brother of the Governor, and it was stated some months ago that it was to be put in order and operated for the treatment of the ores of the Rio Tinto and Americano mines near by. It was thought at the time that such a move was simply to put it in shape to sell, and it would appear now that such was the case.

In Parral the Capusaya Mining Company, of which Senator J. P. Jones is president and A. M. Davis is manager, now at a depth of 500 ft. to the water level, below which no work has been done, is preparing to sink another 150 or 200 ft. by the erection of a new hoist with a 200-gal. bailer. It is expected the rich vein of the Palmillo mine will be encountered. This work has been delayed greatly by the unusually severe winter weather, as has also the work on the 5000-h.p. electric power plant of the Parral Power and Reduction Company, under the concession to Eugene Davis, of Washington D. C. This will now be pushed to completion, and will furnish light and power to Parral and Santa Barbara, and possibly to Inde and Guanacevi, in the State of Durango. Orders have been placed for the mill machinery as well as for the power plant. It is believed also that work will now be pushed by the Pittsburg-Parral Smelting and Refining Company represented by David M. Evans, on the erection of a 250-ton copper and lead smelting plant for treating its ores from the Big Four mine, as well as for custom work. The introduction of cheap power, and this smelting plant, though small, together with the one to be erected by the Chihuahua Smelting and Refining Company at Jimenez, will be of great assistance to Parral, particularly in the mining of its low-grade ores.

At Guaymas, in the State of Sonora, New York capitalists have obtained a tract of 200 acres, on which it is said they will at once erect a 250-ton smelting plant with ample provision for enlargement. This will mean much to the entire State of Sonora, and particularly that part tributary to Guaymas, as the great distance to a custom plant has kept many mines closed. The arrangements to be made, or that have been made, by the Cananea Consolidatel Copper Company, for the increase of its capital stock from $8,640,000 to $10,000,000, gold, will at the present valuation of the stock, give the company something over $3,000,000, gold, with which to make many desired improvements. The company is now mining some 3000 tons of ore a day and has a monthly output of finished products of 5,400,000 lb. copper, 39,000 oz. silver and 395 oz. gold. The improvements that are to be made, together with the new pipe line to Sonora river, electric haulage, steam shovels, and many mechanical or automatic devices, all of which have been or are being installed, as well as the system of caving that has been adopted in several of the mines, will allow of a great increase to the present large output and it is said will enable the campany to treat 1-per cent. copper ore.

London. March 31.

Following on the recent speculations in New South Wales in connection with the zinc, lead and silver production, Messrs. Bewick, Moreing & Co. have turned their attention to the old silver mines in the northern territories of Burma, and several of the other companies who followed the firm from West Australia to New South Wales have gone with them in the new venture. Notably, Lake View Consols, which recently acquired a large interest in one of the Broken Hill properties, has made a large investment in the Burma project. The company which has acquired the property is called the Burma Mines, Railway and Smelting Company, and it has a capital of £260,000 in ordinary shares and £150,000 in convertible debentures. The mines are very old ones and contain many ancient workings. Presumably they were worked for silver alone, for the piles of lead slags are prodigious and should in themselves yield a profit. In writing of the ore reserves Messrs. Sulman & Picard say that 400,000 tons of ore have been at one time or another taken out of the mine, thus giving us a very good idea of what is not in the mine; but, joking apart, there seems to be every prospect of there being still plenty of payable ore. The difficulty in connection with modern smelting has been the absence of railway communication and the scarcity of fuel and fluxes. The former is being overcome by the extension of railroads and the latter by the erection of the smelters at Mandalay instead of at the mine; this being found cheapest for the transport of the various materials required.

The shares of a new company operating gold mines in Russia have made their appearance on the London mining market. This company is the Orsk Goldfields, Ltd., which has been promoted by Heyman Orkin and Messrs. Abrahams & Jonas to acquire some extensive properties in Orenburg district. For many years these properties have been worked by tributors for local owners. Richard Provis, who examined the properties on behalf of John Taylor & Sons, reports the existence of a series of gold-bearing veins and recommends systematic prospecting and development. Mr. Provis has now gone out to manage the property, but independently of John Taylor & Sons, who decided not to continue their connection with the company. Edward Hooper has been appointed consulting engineer. Like most English mining companies, the Orsk Goldfields is overcapitalized. A purchase price of £500,000 seems far too much for what is after all nothing but a promising prospect. I hope that one day our leading mining engineers will be able to protest to some purpose against the overcapitalization of companies. It should be mentioned that it was Mr. Orkin who originally introduced in London the important Siberian copper property owned by the Spassky Copper Mines, Ltd. The Orsk and the Spassky are, however, controlled by entirely different groups.

Good import business continues to be done in 50 per cent. antimony ore, principally from the Hillgrove district, New South Wales, the local prices ranging from £10 to £11 per ton. A decline is expected, however, when Japanese production becomes resumed on normal lines.

Paris. April 3.

It is now many days since the fateful disaster happened at Courrieres, and uncertainty still exists regarding the exact number of victims. The company maintains an approximate figure of 1100, but in various quarters it is stated that the total number of victims will be nearer 1500. A census will have to be made by the municipal authorities before final figures can be quoted. Meanwhile, the judicial inquest is taking its course, and vari-

ous miners give testimony daily. Some of these depositions are interesting, as, for instance, that of three overseers, which briefly stated is as follows: The fire, the initial cause of the explosion, was discovered on the night of Tuesday and Wednesday preceding the accident by one of these overseers. Three old workings in the St. Cecile division of the mine in which no work had been done for 15 years had started burning. The engineers were informed, and about seven hours later the first precautions were taken against the fire. Walls were erected 160 ft. on either side of the fire, the first being finished on Thursday and the second at 5 o'clock on Saturday morning, just two hours before the catastrophe. The two engineers who directed the work had no previous experience with fires for no fire had ever occurred in the Courrières concession. Since Thursday workers at the bottom of the shaft had been much inconvenienced by smoke, so much so that cylinders of oxygen had been sent down for their use. Several times miners overcome by the gas had been brought to the surface in a fainting condition. Instead of eight-hour, four-hour shifts were being worked. When the second barrier was finished the two engineers made a tour of the mine with three foremen, and then went to the surface: they had barely left their lamps in the lamp-room before the explosion.

As a matter of fact, the authorities at the mine are at their wits' end regarding the next move. There is not enough water available to flood the mine, and the fire, which has never ceased to extend, has reached the spot where new workings are in hand, and has caught timber. In order to reach bodies known to exist at certain spots, entries are being opened in places not liable to take fire.

Meanwhile, the miners' strike continues to increase, and will probably include the whole of the 100,000 miners in the Pas de Calais and Nord mining districts. Meetings are being held at the mines advocating improved conditions, the broad lines of which have already appeared in the JOURNAL. Generally speaking, the most popular demand is an eight-hour day for eight francs wages. The mining delegates held a meeting in Paris on Sunday last at the offices of the Minister of Public Works, and at this meeting, which lasted six hours, the delegates of the mining companies offered an increase of 10 per cent. in the miners' premiums, which offer will be referred to the strikers. It is, however, very doubtful whether the present mood of the mining population is such as to give rise to hopes of conciliation, and a general strike of miners in the whole of the north of France is expected.

[Such a strike actually followed, as our correspondent anticipated, and over 60,000 miners are now out. They have, moreover, shown such feeling against the companies that a settlement seems difficult.—Editor.]

General Mining News.

ARIZONA.

GILA COUNTY.

Iron Cap—The National Mining Exploration Company, which has a bond on this property, has ordered equipment, including 15-h.p. gasolene engine, ore cars, buckets, cables, track, etc. Power drills will also be purchased as soon as they can be used advantageously.

GRAHAM COUNTY.

Shannon—The company is putting in a 100-ton track scale and is arranging additional bin capacity at the smelter to handle from 4000 to 5000 tons of concentrating ore and 2000 to 3000 tons of smelting ore.

MOHAVE COUNTY.

De La Fontaine—This property was recently investigated by W. G. Swart, with a view to working its lead and zinc deposits. Tests will be made on electromagnetic and electrostatic separators.

CALIFORNIA.

CALAVERAS COUNTY.

Josephine—A three-stamp mill is being erected on this mine in San Antone creek, near Dogtown. The ledge is about 2 ft. wide, on which there is an incline shaft 155 feet deep.

Essex Consolidated Mining Company—This property, comprising the Jones mine and Allison group, five miles south of Angels, is about to have active work commenced upon it. The four-stamp mill has been overhauled and a tramway 1000 ft. long is to be installed. M. A. Lathrop is superintendent and F. H. Bernard, of Beverly, Massachusetts, is vice-president of the company.

Kenrose Ranch—Daniel Black has taken charge of this ranch and the mines near Rich Gulch, and will shortly have a large force of men at work.

Red Hill—This mine near Vallecito, owned by Chas. D. Smyth, of Angels, has been bonded to Los Angeles men who are about installing a hoist, compressor, five-stamp mill, etc. The property has a 350-ft. tunnel and a small shaft.

EL DORADO COUNTY.

Alpine—A new company has taken hold of this mine at Garden Valley and the work of underground surveying is now in progress. Active work will soon be resumed.

Carpender's Mine—The Milwaukee company which has bonded this and the Prospect Flat mine near Smiths Flat, is driving tunnels in the blue gravel and testing it at the Prospect Flat mill.

Newtown—Near this place several Eastern parties are bonding and testing gravel properties.

INYO COUNTY.

Neylon Group—The group of mines northeast of Bishop, owned and worked for nearly 20 years by Owen Neylon, has been bonded to W. D. Clair. It comprises the Index, Admiral Dewey, Reliance, Excelsior, Mohawk, Evergreen, Keystone and Mabel. Some of the ledges are wide and carry good values. There is a good water supply and the ore may be cheaply milled.

Wild Rose District—In this district in the Funeral Range several properties are being developed, the most work being done by the Wild Rose Company. The ore has to be sacked and shipped to smelters at present, there being no milling facilities.

Mount Whitney—This company at Lone Pine has run into two good feet of very high-grade ore. The mill is about ready to start up.

MARIPOSA COUNTY.

Grimshaw—This old mine near Hornitos, has been reopened by Wm. Carey, of San Francisco. The shaft has been sunk 300 ft. but will be deepened. Electric power will be used.

NEVADA COUNTY.

Sultana Mining Company—The large new rock-breaker for this property has arrived at the mine thus completing the equipment.

New York-Grass Valley Mining Company—The new mill at this property, Grass Valley, is almost finished and work will shortly commence on the cyanide plant.

LeCompton—This mine in Nevada City has been bonded to E. P. Vandercook and E. S. Mayhew, of San Francisco, after an examination by Karl Howard. The mine will now be opened on an extensive scale under superintendence of R. S. Specht. The mill, hoist and other machinery are being overhauled and put in order preparatory to further sinking.

PLACER COUNTY.

Bear River—W. P. Hammon will this season operate two dredges on Bear river, near Sheridan. Machinery for the dredges is arriving at Sheridan.

Blue Eyes Mining Company—Scherer & Co. have completed a contract for a 400-ft. tunnel on this mine, Last Chance, and are about to start on another contract to extend it.

Home Ticket—It is understood that rich gravel has been struck in this mine at Deadwood, on the Forest Hill divide. The mine is owned by local people, who have been for some time developing it.

SAN BERNARDINO COUNTY.

Bonanza King Development Company—This old silver mine 25 miles north of Fenner, and idle for the past 25 years, is about to be reopened by Los Angeles men. An adequate supply of water for the mill has been developed and a 10-stamp mill has been ordered. The Trojan Mining Company has leased the property for 15 years on royalty.

SHASTA COUNTY.

Antlers—This mine, five miles from Downieville, is being worked under bond by T. E. Hayden. The tunnel is expected to strike the vein very shortly. There are four locations on the property.

Keystone—Work is about to be resumed on this quartz mine at Sierra City. The main tunnel is a mile in length. The mine was formerly worked through a shaft, but excess of water stopped work for a long period.

Crown Deep—This mine, which formerly shipped large quantities of quartz ore to the smelters at Keswick, is now shipping to the new smelters at Kennett.

Red Ledge—In the Spring ledge of this group at Igo, E. M. Aldrich, superintendent, a 15-in. ledge of high-grade ore has been struck. Some of the assays run as high as $185 per ton.

SISKIYOU COUNTY.

Eliza—At this property, on the north fork of Humbug creek, they will shortly start up for the summer work, and a 50-ton cyanide plant is being added.

Highland—At this mine, China gulch, an extra force of men will shortly be employed to run a lower tunnel.

Hardscrabble—This group will shortly be opened by Los Angeles men, who expect to install a milling plant and other machinery next month.

Jumbo—This group, on Salmon river, now has 20 men at work upon it. The owners also now own the Lucky Bob mine, so long in litigation.

California Consolidated Mining Company—This company, on Eddy's gulch, are making the connections between the Stephens and Mountain Laurel claims, to tap a large body of low-grade ore in the former mine. The 20-stamp mill is being fitted up for work.

Medina Mining Company—At this mine, Oro Fino, G. N. Addison, superintendent, the 10-stamp mill is operating steadily on good ore. The long tunnel on the Johnson claim is now in 640 ft., and will cut the ledge soon.

TRINITY COUNTY.

Bear Tooth Gold Mining Company—At this mine, in the New River section, F. P. Burns, manager, a 1400-ft. double aërial tramway is to be erected at once. A 40-h.p. gasolene hoist has been ordered. The mine has a Huntington and a triple-discharge stamp mill. There are four tunnels on the property.

TUOLUMNE COUNTY.

Confidence Mining Company—At this property, Confidence, the cyanide plant is about to be started up after a long shutdown. The mill has also been idle since last fall, but will begin crushing as soon as fuel can be got in. Fifteen miners are at work.

COLORADO.

SAN MIGUEL COUNTY.

Ophir Consolidated Mines Company—The United States Circuit Court at Denver has recently appointed Arthur R. Townsend, of Telluride, receiver of this company's property, consisting of a group of 76 claims and a 50-stamp mill at Ophir Loop. It is understood this action will not interfere with the lease of H. H. Hutton and F. E. Trumble on the Silver Bell mine, embraced in the group, and a portion of the milling plant. The Ophir Consolidated has been in financial straits for the last two years, despite strenuous efforts of the directors to raise sufficient funds to liquidate the indebtedness and place it on its feet. Mr. Townsend is a member of a firm leasing on the Smuggler-Union mines.

Pandora Gold Mining, Milling and Development Company—This company has made another strike of rich ore in its lease on the Pandora vein, containing 2300 ft., between the Smuggler-Union mines and the Valley View group, in Marshall basin. The rich streak is from 12 to 22 in. wide and assays high in gold and silver. It has continued for more than three weeks in driving the upper tunnel ahead on the vein, and has been steadily increasing in width. On either side of the rich streak is a quantity of low-grade milling material which runs from $18 to $20 per ton. As soon as the snow melts sufficiently several carloads of high-grade ore will be packed down for shipment to smelters, and a wire-rope tramway erected between the portal of the upper tunnel and the upper terminal of the new Smuggler-Union tramway. Charles Rittmaster and S. L. Fulkerson, of Telluride, are vice-president and general manager, respectively. The Pandora vein is owned by the Smuggler company.

Vanadium Alloys Company—This company's mill at Newmire, on the San Miguel river, 12 miles below Telluride, which has been in course of construction for several months past, was put in operation a few days ago. It was built especially for the treatment of the deposits of vanadium ore lying in the bluffs on both sides of the river and along Bear and Leopard creeks for a distance of about 15 miles. The plant was built largely for experimental purposes, and if successful in the treatment of the rock its capacity will be increased. W. T. Rynard, of Telluride, formerly of Chicago, is managing the property.

INDIANA.

Glacial Mining Company—This company, with office in Martinsville, Ind., has been incorporated to explore, locate work and develop mineral lands, and to do a general mining business in Indiana and other States. The capital stock is $50,000. Charles F. Carver, James Wishart and Frank S. Carver are directors.

INDIAN TERRITORY.

In accordance with the decision of the United Mine Workers to go out on strike April 1 on account of the refusal of the operators to comply with their demands, all, or nearly all, of the mines in the Indian Territory will be idle for a while at least. Very few of the operators will attempt to run their mines, as it is not thought they would succeed.

At many places the miners brought their tools out on March 30 and 31, and very little powder has been purchased for the past two or three days. No coal was blasted down on the last day. There is plenty of coal on hand for 60 days, and it is hard to predict whether the strike will be of long or short duration, or how it will end. Under existing conditions the operators in this section of the country certainly cannot afford to pay any advance and show a firm determination not to do so.

At some few mines the local unions passed resolutions prohibiting the pumpers, firemen and engineers from working after midnight, March 31; but in such cases the district officers are instructing them to rescind such action and allow these men to work in order to keep the mines pumped out. No trouble is anticipated, unless some operators try to produce coal.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Challenge—Enlarged hoisting facilities will be available at this property, owned by the St. Mary's Mineral Land Company, within a short time. A new 1200-ft. hoisting engine from the Nordberg Manufacturing Company, of Milwaukee, Wis., has been received and will be installed immediately. Sinking has reached a depth of 430 ft., the limit of the present hoist. Additional compressor capacity will be available shortly.

Champion—Another shaft will be started in 1907. It will be located south of shaft E. Drifts from the latter are penetrating the ground which will be opened from the new shaft, and draining it of the inflow of water.

Elm River—The shaft on the Winona amygdaloid bed has reached a depth of 800 ft. The plat at that point was cut recently and drifts started at a point 20 ft. higher. The north drift has penetrated some good ground, but the south drift is not encouraging.

Globe—Progress in sinking the large shaft on the portion of this tract that is under option to the Copper Range Consolidated Company is slow, but the work is extremely difficult. A steel pin was driven from the bottom of the shaft, 135 ft. below the surface, and it encountered what may prove to be ledgerock at a depth of 15 ft. additional.

Superior—Sinking in the shaft on the

Baltic lode was discontinued recently at a depth of 370 ft., where the plat for the third level is being cut. Cross-cutting west is expected to reach the lode in 35 ft., and drifts will then be started upon the course of the formation.

Tamarack—Owing to water in the lower levels No. 5 shaft is not yet operating to its full capacity. The openings are being drained rapidly, however, and the shaft will be making its normal production in a short time. Nos. 1 and 2 shafts are still idle, owing to the gas lurking underground and generated during the recent fire. Captains Samuel Robbins and John Free are no longer connected with the Tamarack.

Winona—Eleven drills are in commission, 4 in sinking, 2 in each shaft, and the remainder in driving 8 drifts. The drifts north and south from No. 3 shaft at the eighth level are in commission on alternate days. Drifting south at the sixth and seventh levels of No. 3 shaft and north at the seventh level of No. 3 is under way. Drifting in No. 2 shaft is in progress at the seventh, eighth and ninth levels south. Before the Winona can resume production, as is under contemplation, it would be necessary to build a spur from the Copper Range Railroad to No. 3 shaft and provide rock-crushing facilities there.

Wolverine—No. 4 shaft is making a very creditable production, supplying nearly as much rock as it and No. 3 shaft together produced before the fire destroyed the rockhouse at the latter.

KEWEENAW COUNTY—COPPER.

Mohawk—Some rich ground is being opened in the lower levels of Nos. 1 and 2 shafts. Drifting south from the new No. 1 shaft also reveals productive ground. Daily rock shipments to the stamp mill average nearly 2000 tons.

ONTONAGON COUNTY—COPPER.

Essex Copper Company—A dividend of $1 a share has been paid stockholders from the sum received by the sale of the property to the Copper Crown Mining Company. Another dividend in liquidation will be paid shortly.

Lafayette Mining Company—A dividend of $2.42 a share has been paid from the money received from the sale of the property to the Copper Crown Mining Company. Another dividend in liquidation will be paid.

MISSOURI.

ST. FRANCOIS COUNTY.

The lead companies have not suffered from the strike of the Illinois coal miners. They have been preparing for trouble and have coal on hand enough to last them from 60 to 100 days.

Prospecting with the diamond drill was generally suspended last month on account of bad weather. The condition of the roads made it impossible to move the drills. Work is now being resumed at several places.

Bonne Terre—The St. Joe Company is now hoisting ore of excellent grade from its new North, or No. 14, shaft.

Desloge Lead Company—This company is sinking a new shaft, No. 5. It is on the land recently bought by the company, and known as the Hoffman land, adjoining the Washington county line.

Doe Run Lead Company—This company is enlarging its mill to 900 tons daily capacity. Preparations are being to sink a new shaft on the Mitchell farm.

Federal Lead Company—This company is going to sink a new shaft south of No. 2, on the Derby tract.

Herculaneum Smelting Works—Another large water-jacket furnace, No. 3, is being erected. It is 42x160 in. in size. When it is completed, the last of the old small circular furnaces will be shut down.

NEBRASKA.

NEMAHA COUNTY.

An inspection was recently made by Prof. E. H. Barbour, of the State University, of the new coal opening on Honey creek, south of Peru. The vein is nearly level, and about 3 ft. thick. A slope has been started, and is now in 42 ft. The roof and floor are a compact shale.

NEVADA.

CHURCHILL COUNTY.

Hanson Iron Mine—Nicholas Hanson has received United States patents on the three iron mining claims on the boundary line of Storey and Churchill counties sold to Eastern capitalists last year. The plans of the purchasers include either building a railroad to connect with the Southern Pacific near Wadsworth, for shipping the ore to Pueblo, Colorado, or to a smelting plant that the company may build on the Carson river near Fort Churchill.

LYON COUNTY.

Federal Gold Mining Company—The Federal company now has a force of men employed in preparing for an active campaign. Enough ore is blocked out to keep the milling plant in operation the next four years. The present plant consists of eight stamps and two roller crushers and 10 more stamps are to be added, giving a daily capacity of 75 tons. The plant is operated by electric power from the plant at Floriston, on the Truckee river.

Virginia-Tonopah Dredging Company—This company is preparing to start dredging operations in Gold cañon. Its claims embrace an area of 200 acres of ground in the vicinity of Dayton.

Ohio-Tonopah Company — This company has 20 men employed in blocking out ore in what was formerly known as the Hulley-Logan mine, and has 500 ft. of backs developed. The company will erect a large milling plant this year.

LINCOLN COUNTY.

The Utah-Nevada has two shifts of timbermen each of the No. 1 and No. 5 shafts, making very good progress with the work. A force of carpenters is kept busy framing timbers.

At Royal City the aerial tramway will soon be in running order and everything in connection with the entire work is progressing satisfactorily.

There is a rush to the new silver deposits recently discovered about 30 miles north of Pioche. The ore is high-grade silver, running from 400 to 700 oz. per ton, the ledge averaging 8 ft. in width.

WASHOE COUNTY.

Central Pacific Railroad Company—The trial of the suit of the Central Pacific Company, to eject miners from its patented ground in Washoe county is now in progress in Reno, and is attracting wide interest on account of the injury that would result to mine owners in the event of a decision adverse to them being obtained. The defense claims that the patents were granted to the railroad company through misrepresentation of the land as non-mineral.

WHITE PINE COUNTY.

The Butte & Ely Copper Company, incorporated under the laws of Montana, with a capital stock of 500,000 shares of a par value of $1 each, has acquired by purchase and location a group of twelve promising claims in the heart of the Robinson mining district near Ely. The property of the Nevada Consolidated Copper adjoins the Butte & Ely on the east, while the Giroux Consolidated adjoins it on the west. Both of these properties are fairly well developed and have a large tonnage of ore blocked out in their workings, an estimate giving the Nevada Consolidated company's Ruth and Eureka mines alone 12,000,000 tons. As soon as the railroad, now being constructed between Toana and Ely, a distance of 160 miles, is finished the Nevada Consolidated will operate a 2,500-ton concentrator and smelter, the contract for the material and machinery having been let.

NORTH CAROLINA.

ASHE COUNTY.

Federal Mining and Development Company—This company has been organized in Bristol, Va., with a capital of $25.000. It owns iron claims in Ashe and Watauga counties, and in southwest Virginia. Development operations will be started on the claims in a few weeks. H. C. Aldrich, Bristol, Va.,-Tenn., is manager.

OREGON.

BAKER COUNTY.

Goose Creek—A stampede to the cop-

per belt of this county is now assured. The influx of people anxious to secure good locations for mines has already begun. C. C. Cox, of Baker City, L. Van and Abram Love have holdings in the Goose Creek camp which they have been developing during the past two years. Thomas and Foster also own 10 claims on the ledge and the Forest City. The Exploration and Mining Company, of Cleveland, O., have done development work on 25 claims in the same camp. The ore body in the Van & Love tunnel has been penetrated 30 ft. The ore is copper, gold and silver. At the Snake river end of this copper belt at Homestead is the Iron Dike mine; at the other end of the belt, near Medical Springs, 26 miles northeast of Baker City, are the Indiana mine and the Burkemont group. The Indiana ore is similar to that of Goose Creek and the Burkemont is now showing the sulphide formation in the lower workings.

Mayflower—A dispatch from the Cornucopia camp, 60 miles east of Baker City, states that a strike of free gold ore has been made in the new workings of the Mayflower mine, the property of the Stampede Mining Company.

Ophir—Manager Tom C. Gray, of this Ophir mine in the Cable Cove district, some 30 miles west of Baker City, reports that his miners have just broken into a fine ore-shoot in the Valley Queen vein, which carries 12 ft. of milling ore with 14 in. of a shipping grade. The company proposes to erect a hoisting plant and mill. The property is owned by Wheeler & Co., of New York, and associates.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Nemo Mining Company—John Young and Steve Conners have been doing some work on this ground, and it is showing up very well. A ledge of free milling ore has been exposed. This company owns quite a large acreage, and has very exceptional prospects.

Wasp No. 2—The new boilers have been put in place, and the plant has once more commenced the treatment of ore. A thorough overhauling of all the work has taken place during the enforced idleness, and it is now in as good condition as if it were a new mill.

Queen of the Hills—This company was reorganized at the meeting in Des Moines, and the name of the new company is the Golden Queen. The promoters' stock has been put back in the treasury, which now holds about 500,000 shares. The shaft, which is now 138 ft. deep, will be sunk to the 200-ft. level where crosscutting will be begun. The officers of the new company are as follows: J. A. Sandholm, president; O. L. Browne, secretary; Chas. Radake, vice-president; E. D. Merideth, treasurer. All of these officers are from Des Moines, Iowa. The local manager is James Hall, of Deadwood.

PENNINGTON COUNTY.

National Smelter—This smelter, located at Rapid City, will be started within a few weeks. Preparations are now under way for the blowing in of one furnace, which will give a capacity of 100 tons a day. Ores will be furnished for the present chiefly from the northern hills, and later, when more development work has been done, from the district surrounding Silver City. Arrangements have been been made to have coke shipped from Colorado, and an abundance of limestone can be procured just outside of Rapid City.

Iron Deposits—A body of iron ore 12 miles west of Rapid City will probably be worked at an early date. A new railroad, the Missouri River & Northwestern, has just been opened, and this will give to this vicinity a chance to transport the ores. The chief difficulty with this district hitherto has been the lack of transportation facilities. This ore will be run from 40 to 75 per cent. metallic iron. The ore is a red-brown hematite free from phosphorus and sulphur.

TENNESSEE.

CARTER COUNTY.

Boston Iron and Timber Company—This company, organized and incorporated in Tennessee several years ago by George K. Hamblen, New York; William Spalding, of Boston; John C. Anderson, of Bristol, and others, is being wound up in the Chancery Court at Elizabethton, under the receivership of C. P. Toncray. The mineral lands, iron-mining properties, will be sold at public auction by the receiver. The Cross Mountain Iron Company, recently organized by Hamblen, Spalding, Anderson and others, will probably purchase the property. The stockholders of the Boston Iron and Timber Company will receive about 20 per cent. of the par value of their stock.

TEXAS.

HARDIN COUNTY.

Saratoga—The Guffy Petroleum Company's B. B. Bob No. 4 well came in a gusher, flowing over 10,000 bbl. the first day, then filled with sand. It will, no doubt, be brought in again. The well is 1000 ft. north of former gushers and in territory which heretofore has had only small pumpers.

The Britton Oil Company has a new well on the little Jap lease which had an initial flow of 1500 bbl., and is still flowing 900 bbl. daily. The advent of these two wells has stimulated operations and new wells are being drilled by the Sun Oil Company, H. H. Robinson, the Guffy Petroleum Company, the Britton Oil Company, and others.

Sour Lake—A fire in the Shoestring tract last week caused a loss of $30,000. Numerous drilling outfits, derricks, tanks, and equipment were destroyed, the Texas Company was the largest loser.

Gordon & Nelson are drilling two wells on the Cannon tract.

The Bass & Eastham deep well is making slow progress in hard rock. The success of this well means new life to this field.

Beaumont—The following are drilling wells on Spindletop: T. Schauman, Guffy Petroleum Company, Gordon & Nelson, Moore & Bass and H. H. Paulhamus. The district court has dissolved the temporary injunction restraining Moore & Bass from drilling through the cap rock on Spindletop with a rotary drill. The injunction was obtained on the ground that the use of the rotary caused much damage by forcing water into the oil-sand.

The main features of the last two weeks have been the advance of 2c. in prices for all fields and the increased output of Jennings, which is now nearly one-half of the total for southern fields.

Humble production continues to decline, and from first place it will probably fall to the last among former Texas gusher fields. The total output of the Gulf Coast oil-fields is now less than 60,000 bbl. daily, and any change in prices will be upward.

Production and current prices are as follows: Sour Lake, 6500 bbl., 41c.; Saratoga 5000 bbl., 32c.; Batson, 8000 bbl., 31c.; Humble, 7000 bbl., 35c.; Spindletop, 4000 bbl., 45c.; Jennings. 25,000 bbl., 25c.; Dayton, 500 barrels.

NAVARRO COUNTY.

Corsicana—There is a rush of oil operators to the new field at Powell. Two more wells owned by Carmody & Co., and the Ennis Oil and Development Company came in recently. They are situated on the Burke lease, and are good producers.

TYLER COUNTY.

Colmesneil—F. D. Badgeley is drilling the old well on the Shilling farm to a greater depth. The Texas & Oklohoma Oil Company abandoned it at 2370 ft. depth.

UTAH.

JUAB COUNTY.

Tintic Ore Shipments—For last week aggregated 178 carloads, the shippers and amounts being: Yankee Consolidated, 3; Uncle Sam, crude ore, 4, concentrate 2; Scranton, 2; Swansea, 4; May Day, 5; Victoria, 4; So. Swansea, 4; Ridge & Valley, 5; Lower Mammoth, 4; Gemini, 17; Eagle & Blue Bell, 9; Centennial Eureka, 54; Beck Tunnel, 8; Brooklyn Consolidated, 1; Eureka Hill, 12; Grand Central, 8; Bullion Beck, 9; Ajax, 4; Carisa, 4; Dragon Iron, 4.

Yankee .Consolidated—This company has succeeded in its effort to develop a water supply for milling purposes.

Godiva Mill—Practically everything is in readiness for the starting of this plant, which event is expected to take place during the coming week.

SALT LAKE COUNTY.

Montezuma—This Bingham property has been equipped with machine drills and development work is being pushed day and night.

Albion—This property at Alta will begin shipping again as soon as the roads improve.

Kremlin—This property at Bingham is the scene of a vigorous development campaign. The shaft is being put down to the 500. On the 300 level an immense shoot of mill ore has been opened, having been cross-cut for 60 feet.

Columbus Consolidated—This company, operating at Alta, is installing a second generator in its power plant, doubling the electrical energy for use at its mine and mill.

TOOELE COUNTY.

New Stockton—This property is now paying its own way, and more, with the output of the 60-ton mill. Developments on the 850 level during the past few weeks have been important. Some extensive bodies of high-grade shipping-ore have been opened into. With the condition of the roads improved, shipments will be materially increased.

Honerine—Owing to the recent changes in the ownership of a controlling interest in this property, the production of ore has not been resumed as anticipated, but probably will be next month.

UTAH COUNTY.

Mascott—An 8-ft. body of ore carrying $8 per ton in gold has been opened in this property. The company, which has headquarters in Provo, has a tunnel run 100 feet.

VIRGINIA.

DICKENSON COUNTY.

George L. Carter, of Bristol, Va., head of the South & Western Railway and the George L. Carter syndicate, is said to have optioned several coal and iron properties in this county.

WASHINGTON.

FERRY COUNTY.

Pearl Consolidated—Connection has been made between the bottom level drift on the vein and the winze from No. 2 tunnel level, and stoping between both levels will be started immediately. W. M. Crummer has resigned his superintendency and A. C. Cook, formerly foreman of the Mountain Lion mine, has been appointed in his place. The working force has been reduced to 16 men. After levying 11 assessments, the board of directors passed the 12th and hopes to make the mine self-sustaining. Much, however, will depend on the market for the ore. The report that a contract had been made for shipments of ore to the Pilot Bay smelter was untrue, although negotiations are pending in that direction.

Anonymous—The tunnel is in 170 ft. and may have to run 200 ft. further, to tap the vein at a depth of about 250 feet.

Oversight—The manager reports that he is putting in ore-bins and getting ready to ship ore.

WYOMING.

CARBON COUNTY.

Penn-Wyoming Copper Company—The concentrating plant of this company at Encampment, built last year, has been destroyed by fire, together with the power-house and electric lighting plant. The loss is estimated at $300,000, about half covered by insurance. The smelter buildings were saved.

Foreign Mining News.

MEXICO.

MEXICO.

Los Dos Estrellas Mining and Milling Company—This company is about completing a new mill and cyanide plant at a distance of 1½ km. from the old mill at El Oro. The mill will be fitted with 6 Allis Chalmers crushers, 120 stamps, three 24-ft. tube mills; 600 tons daily capacity. The ore is free milling and plates will be used. The sands for cyaniding will be conveyed to vats by conveyor belts. Power will be electric, furnished by Mexican Light & Power Company from Necxa plant. The mill was constructed by I. W. Caline, of San Francisco, Cal. W. H. Armstrong, Jr., will be superintendent of mill.

AFRICA.

TRANSVAAL.

The gold production in March is reported at 443,723 oz. fine; an increase of 36,055 oz. over February, and of 43,900 oz. over March, 1905. This is the highest monthly output ever reported. For the three months ending March 31 the total was 1,280,029 oz. fine gold, or $26,458,200; which compares with 1,132,892 oz. in the first quarter of 1905; an increase of 147,137 oz., or 13 per cent., this year.

NEW CALEDONIA.

Exports in January were 6092 metric tons nickel ore, 84 tons cobalt ore and 7317 tons chrome ore. Of the chrome ore 3649 tons were sent to the United States.

Work is progressing on the coal property at Nondoue. Coal is being taken out and shipped to Noumea, and the quality is found to be excellent.

Coal Trade Review.

NEW YORK, April 11.

The suspension of work in the anthracite region still continues, and negotiations for a setlement are still going on. The offer of the miners to arbitrate the questions at issue has been met by a counter-proposition from the operators. They are willing to arbitrate, but on a different basis from that offered by the miners' committee. The companies' representatives make the following offer:

"The members of the Anthracite Strike Commission, or such of them as may be able and willing to act (not less than a majority of the whole number), shall be requested to decide whether any changes in the conditions of the anthracite industry have occurred since the award of the Anthracite Coal Strike Commission which require that the award should be modified as to the following subjects, and if so, what that modification shall be:

"(1) As to wages or rates of payment of the employees, either by way of increase or reduction.

"(2)As to adjustment of complaints through the Conciliation Board or otherwise.

"Any party so desiring shall present his claim in writing to the commission, stating the same in detail.

"Work shall be resumed at once. The award shall be effective from April 1, 1906, and the present award of the commission with any modification thus made shall continue in effect until March 31, 1909. Three years are suggested because that time has been found satisfactory in the present case, and also because this would avoid introducing into purely business questions the political considerations of a Presidential campaign.

"The members of the commission shall be paid such compensation for services and expenses as may be fixed by themselves. The operators shall furnish one-half of the same and your committee shall furnish the other half."

The miners' committee has taken no action as yet on this proposition, which was submitted on April 10.

In the Western coal-fields the situation is mixed. In Pennsylvania the large companies have generally signed the 1903 scale. The independent operators, who refused to join at first, are generally following this example. In Ohio, however, there is a disposition among the operators to hold out for the present. In Indiana the sitution is mixed, with a disposition to sign the scale quite evident. In Illinois again, there is strong opposition to the settlement, but nothing has yet been decided. The large consumers in the West, as a rule, seem to expect an early settlement.

COAL TRAFFIC NOTES.

The total coal and coke traffic originating on all lines of the Pennsylvania

Railroad east of Pittsburg and Erie for the year to March 31, was as follows, in short tons:

	1905.	1906.	Changes.
Anthracite	1,018,967	1,330,747	I. 311,780
Bituminous	6,743,480	9,332,869	I. 2,589,389
Coke	2,696,445	3,150,406	I. 453,961
Total	10,458,892	13,814,022	I. 3,355,130

Shipments of Broad Top coal for the week ending April 7 were 14,047 tons; for the year to April 7 they were 287,684 tons.

Shipments of anthracite in March are reported at 5,745,868 long tons; an increase of 487,301 tons over March, 1905. For the three months ending March 31, the total was 13,589,716 tons in 1905, and 15,916,015 tons in 1906; an increase of 2,326,299 tons, or 17.1 per cent. this year.

New York. April 11.

ANTHRACITE.

A settlement of the labor difficulties in the hard-coal regions appears to be about as far removed as ever. The joint committee of miners and operators met Tuesday afternoon but came to no decision. The impression prevails that the miners will ultimately abandon most of their claims and agree to the operators' suggestion as to the continuation of the previously existing agreement.

In the meantime, coal mining has come to a standstill; some companies have already begun to ship from their stock piles, but others have ceased shipments altogether. Prices are not affected by the disorganization but remain as follows: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@2.50 for buckwheat; $1.45@1.50 for rice and $1.30@1.35 for barley f.o.b. New York harbor shipping points.

BITUMINOUS.

The Atlantic seaboard soft-coal trade is in a disturbed condition natural to the unsettled labor question. The general feeling is that under no conditions will soft-coal miners go on strike in sufficient numbers to bring a shortage of coal in the Atlantic seaboard market. The questions in dispute in the various parts of the producing territory, tributary to the Atlantic seaboard, in some places affect vitally the life of the mines, while in others they are merely additional burdens on the producers. In a large part of the producing territory the demands of the miners have been conceded.

Producers are keeping their contracts well in hand and are devoting all possible coal to this purpose. Demand is lighter than would be expected, consumers having filled up to a great extent prior to April 1. The transient market is dominated by the speculators. At this writing the market is receding, but it varies from hour to hour according to the anthracite prospects. Speculative coal has sold as high as $4@4.50 f.o.b. New York harbor shipping points. Poorer grades can be bought for $3.25 and they run up to $4 according to grade. The speculative condition of the market is fostered more by the commission houses than by any other portion of the trade.

Trade in the far East is not active, abundant supplies having been accumulated. The Sound is comparatively easy, except for special cases of urgency. New York harbor trade is in the hands of speculators, although consumers are keeping well up with their contracts. All-rail trade is fairly active though demand is not as heavy as would be expected. Transportation is excellent on all roads and car supply is abundant, since many anthracite cars are being used for soft coal.

The coastwise vessel market shows a weakening, and freights are dropping materially. Current rates from Philadelphia are: To Boston, Salem and Portland, 85@90c.; to Lynn, Newburyport, Saco and Gardner, $1; to the Sound, 65@70c.; to Portsmouth and Bath, 90c.; and to Bangor, $1@1.05 per ton.

Birmingham. April 9.

The coal production in Alabama is almost as heavy as it was in mid-winter. Almost all of the railroads are short of locomotive power and shipments are a little slow. There is no change in coal quotations. It is reported from more than one office that the demand has not slackened up, notwithstanding the approach of the hot season. Several good contracts have been made recently for a heavy supply of coal which will last until September.

There is a strong demand for coke and that product brings a good price despite the fact that the furnace needs are not so strong.

R. H. Sayre and A. N. Cleaver, of Bethlehem, Pa., officers and directors in the Sayre Mining and Manufacturing Company and Little Warrior Coal and Coke Company, in the Birmingham district, are now visiting the properties. Mr. Sayre has large holdings in coal lands in this State, in fact he is the largest individual coal property owner in the State.

Chicago. April 9.

The wholesale coal market has been somewhat dull in the last week and probably will continue dull for several weeks, owing to the fact that most consumers of large amounts of coal have stocks, laid in before the suspension of mining, and will not buy more until these stocks are low or mining is resumed. Prices are naturally high, on the business that is being done, and will go higher under continuance of present conditions. Coal from Eastern mines that are not affected by the strike is selling lightly, though in good supply. It is estimated that the present supply of Western bituminous will last about 45 days. Meantime there is hope of arbitration of the differences between miners and operators in the Illinois and Indiana mines and the public generally seems optimistic, refusing to believe that the strike will continue long.

Illinois and Indiana new supplies probably will be exhausted within a week, except for the small amount mined by non-union mines. Steam lump from these two States brings $4@4.50; run-of-mine ranges $3@4, and screenings are up to $2.50. There is considerable coal stored in the city by retailers as well as manufacturers and the railroads generally are well supplied.

Hocking is very scarce and has sold for $4@4.50, the higher price representing sales now. Smokeless likewise is in short supply, and sales are mostly to customers that use this coal regularly. On general sales smokeless is quoted at $4.05. Kentucky coal is coming into the market, at about $4 for lump and $3.75 for run-of-mine, and should the socks of Western run low without the prospect of fresh supplies from the mines, the Kentucky mines probably will find profitable sales in this territory, heretofore not reached by them for large business.

Anthracite is selling lightly in view of the continuance of the March price instead of the usual 50c. discount for April. The demand for it will not be great until autumn, in the lack of the discount, which, it is said, will not be made this year. Slight efforts are being made by the anthracite agents to sell coal, most of the large houses having withdrawn their agents from the road.

Cleveland. April 10.

The coal situation in this territory has eased perceptibly. The first scare over the coal strike is now dispelled and consumers find that they have little need to fear an urgent shortage. The terrified buying has stopped. The producers have not yielded their prices to any extent, having little coal to sell, but it is apparent that the market is weakening rapidly, and a sharp break may be looked for at any time. Run-of-mine steam coal is now selling at $3 delivered, while slack is selling still at $2.50 delivered, with prospects of prices nearer to normal before another week has passed. The situation has so far been relieved that many coal-loaded boats have started up the lakes, anticipating the opening of the Sault channel. The rates of carriage have held at 5c. under last year. This brings the rate to the head of the lakes to 25c. and the rate to Lake Michigan to 35c. The coke market is shifting some also. The best grades of foundry coke are selling at $3.25 at the oven and furnace coke is selling at $3 at the oven.

Pittsburg. April 10.

Coal—The independent coal interests that had been holding out against granting the demands of the miners at a meeting on Friday night decided to yield, and all have signed an agreement to pay the scale of 1903. It is estimated according

to reports received today from all parts of the district that 98 per cent. of the mines are in full operation. All of the mines of the Pittsburg Coal Company and its allied interests, including the Monongahela River Consolidated Coal and Coke Company and the New York & Cleveland Gas Coal Company, except one mine, are running to capacity. A large number of miners from other fields where a strike is on are coming to the Pittsburg district and are being given employment. The production this week will be unprecedented and if there is no break in the ranks of the operators in Ohio, Indiana and Illinois who are resisting the demands, the output from the Pittsburg district will be enormous. The quotations given out by leading operators are based on $1.10 a ton for mine-run coal and 80c. is quoted for slack. Despite this announcement it is known that $2 a ton and more is being paid in many instances. About 3,000,000 bush. were shipped by river to southern markets last week and it is likely that a great deal more will be sent out this week as the rivers are at a good boating stage.

Connellsville Coke—For prompt shipment $3 is quoted for furnace and $3.25 for foundry coke, but for future delivery $2.40@2.50 can be done for furnace and $2.90@3.10 for foundry. The production for the week amounted to 269,654 tons. The shipments aggregated 12,058 cars distributed as follows: To Pittsburg and river points, 4364 cars; to points west of Pittsburg, 6438 cars; to points east of Everson, 1256 cars. The combined output from the Connellsville and Masontown fields amounted to 349,987 tons.

San Francisco. April 5.

The coal market remains quiet with no change in conditions or prices.

For coast coals, in large lots to dealers, prices are: New Wellington and Richmond, $7.50; Roslyn, $7; Wellington, Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car-lots, prices are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunnyside, $8.50. Eastern coals are largely nominal at $14 for both anthracite and Cumberland. Foreign coals, ex-ship, in large lots are: Cannel, $8.50; Brymbo and Walsend, $7.50. No Welsh anthracite on the market.

Foreign Coal Trade.

April 11.

Imports of British coal into Argentina in 1905 were 1,783,996 tons.

The Swiss Federal Railways recently placed a contract for 1,080,000 tons of coal and briquets with the German Coal Syndicate.. The prices named are 15 marks ($3.57) per metric ton for locomotive coal, f.o.b. Manheim; 15.50 marks ($3.69) for briquets, same delivery.

A heavy movement of coal is reported from Germany into France, as a result of the miners' strike in that country.

The miners in the Nord and the Pas-de-Calais, in France, show no disposition toward a settlement, and the situation is regarded as grave.

Iron Trade Review.

New York, April 11.

While the coal situation still causes some hesitation, there is a better undertone in the market, probably due to a belief that the Western operators will follow the example of the Pittsburg district in settling with the miners, and that there will not be a long strike, either East or West.

Small orders for pig iron are coming in quite freely, and some larger ones are beginning to show. Furnaces are generally holding firm as to prices, and are inclined to look for plenty of work. In finished material the rush for structural steel is still on; all the world seems to be building or getting ready to build. Bridges as well as buildings are calling for material. The demand for rails is also large, electric lines making quite a figure, as well as the steam railroads.

While there will probably be no strike of lake seamen or dock workers, preparations for the opening of lake navigation are going on in a very leisurely way. While the channels will be open early, it looks now as if very little ore would come down before May.

Upon the whole, the trade is in a better position and very little interruption is expected for some time to come.

Exports and Imports—The exports of iron and steel, including machinery, from the United States for the two months ending Feb. 28 are valued by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1905.	1906.	Changes.
February	$ 9,183,266	$12,747,343	I. $3 564,077
Two months	17,001,755	25,728,079	I. 8,726,324

The increase in February was 38.8 per cent.; for the two months, 51.3 per cent. The chief items of iron and steel exports were, in long tons:

	1905.	1906.	Changes.
Pig iron	18,072	11,721	D. 6,351
Billets, ingots & blooms	23,462	40,726	I. 17,264
Bars	10,616	12 449	I. 1,833
Rails	34,443	55,651	I. 21,208
Sheets and plates	4,914	12,061	I. 7,147
Structural steel	12,431	12,059	D. 372
Wire	14,763	23,759	I. 8,996
Nails and spikes	6,639	12,067	I 5,428

Exports of iron ore—chiefly to Canada—were 1890 tons in 1905, and 7079 tons in 1906; an increase of 5189 tons.

Imports of iron and steel, including machinery, for the two months ending Feb. 28 are valued by the Bureau of Statistics as follows:

	1905.	1906.	Changes.
February	$1,703,073	$1 875,173	I. $172,100
Two months	3,814,131	4,300,190	I. 486,059

The increase for February was 10.1 per cent.; for the two months, 12.8 per cent. The chief items of these exports were, in long tons:

	1904.	1905.	Changes.
Pig iron	19,638	40,629	I. 20,991
Scrap	2,523	6,026	I. 3,503
Ingots, blooms, etc	2,173	3,676	I. 1,503
Bars	5,588	8,178	I. 2,590
Wire-rods	2,593	2,915	I. 322
Tin-plates	13,103	5,237	D. 7,866

Imports of iron ore for the two months were 99,195 tons in 1905, and 182,018 tons in 1906; an increase of 82,823 tons. Imports of manganese ores were 42,019 tons in 1905, and 28,333 tons in 1906; a decrease of 13,686 tons this year.

Birmingham. April 9.

The larger furnace companies in the Birmingham district will not quote under $14 per ton for No. 2 foundry. There is no accumulation noticed as yet and good authority is had for the statement that orders are on hand for the better part, if not all, of the probable make for the next two months to come. Some orders have been received lately, with two or three exceptions for small lots. Alabama furnace companies recently secured a good sized order, delivery on the product to be made during July and into the third quarter. There have been numerous inquiries again received in this district.

Some of the smaller furnaces in this district sold iron last month under $14 per ton but inquiry does not reveal any iron sold under $14 this month as yet.

The Southern Steel Company announces that the nail mill at Ensley, which was destroyed by fire in January is being rebuilt rapidly and that on May 1 it will be far enough advanced to permit of a resumption of work.

John A Topping, president of the Republic Iron and Steel Company and chairman of the board of the Tennessee Coal, Iron and Railroad Company, left for the North last Thursday after spending nearly two weeks in this district. He announced the appointment of J. A. Durfee as general superintendent of the Ensley division, which includes the steel plant and six furnaces at that point. J. W. Shook continues as superintendent of furnaces in the Ensley division. A general superintendent of brown ore mines has been named as well as a purchasing agent for the two companies and a general storekeeper. It is believed here, though there is no authority for the guess, that W. H. Hassinger, now vice-president and Southern manager for the Republic Company, will be made president of the merged companies.

Cleveland. April 10.

Iron Ore—The vessel-owners, having accomplished their purpose of delaying the opening of the season of navigation for about a month, are now ready to settle with the lake labor unions for the running of boats after May 1. Before terms will be agreed to, however, the conference between the longshoremen and the seamen

will be held the first of next week to settle the question of the affiliation of the lake pilots. These will probably go with the seamen, which will automatically adjust the differences, since the Lake Carriers' Association has already recognized that branch of the pilots affiliated with the seamen. In the meantime some boats are bound up the lakes, anticipating the opening of the channel through the Sault, and some boats are loaded with ore at the head of the lakes for the first trip down. The warm rains of early April are thawing the ice and the channels will probably be open by April 20 at the latest.

Pig Iron—Buying of pig iron during the week has been good, but most of it has been in the foundry grade for delivery through the remainder of the second quarter and running into the third quarter a short time. One lot of 12.000 tons is reported sold, but the price is not announced. Other lots under inquiry run from 1000 to 5000 tons. An increased amount of gray forge is said to have been sold to the bar-iron mills, replacing scrap. The price ranges between $16.50 and $17 in the Valley for No. 2 foundry.

Finished Material—Western mills are selling bar iron now at 1.50c., Pittsburg, while the mills in this territory are better fixed as to orders and are holding for 1.65c., Youngstown. Sheets are stronger and the jobbers are doing most of the business. Structural mills not being able to make deliveries, the jobbers are getting the bulk of that business also.

New York. April 11.

Pig Iron—Business has been a good deal in suspense, owing to the uncertainty about the coal situation. There have been, however, a number of sales, chiefly of small lots. The Northern furnaces have generally advanced prices, but not much iron has been sold yet at the higher figures.

For Northern iron in large lots we quote: No. 1 X foundry, $18.50@19.25; No. 2 X, $18@18.75; No. 2 plain, $17.50@18; forge, $16.25@16.75. Southern iron is held firmly by the larger companies on the basis of $14 Birmingham for No. 2. For large lots on dock, New York, prices are: No. 1 foundry, $18.25@18.50; No. 2, $17.75@18.25; No. 3, $17@17.50; No. 4 $16.25@17; No. 1 soft, $18.25@18.50; No. 2 soft, $17.75@18; gray forge, $16.25@16.50. Basic is held at $19 for Virginia, $18.50 for Alabama and $18 for Northern.

Cast-Iron Pipe—Prices are higher, the present basis being $30.50 per net ton for 6-in. pipe in carload lots at tidewater points. A large contract for New York City is pending.

Bars—Business is slow, and prices are unchanged. Sales are at 1.645@1.695c. for common iron bars, and 1.745c. for refined iron. Steel bars are also 1.645c., tidewater. Store trade is easy, at 2c., delivered.

Plates—Steel plates are in moderate demand. Tank plates are nominally 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745@1.845c.; according to width. Sales have been chiefly in small lots.

Structural Material—Prices are nominally unchanged. Beams under 15 in. are 1.845c. for large lots; over 15 in., 1.895c.; angle and channels, 1.845c., tidewater delivery. Jobbers ask a considerable advance on small orders. New business continues to come forward; apparently there is no end to building projects.

Steel Rails—No change in standard sections. Light rails are in steady demand, prices ranging from $26 for 25-lb. up to $33 for 12-lb. rails. The demand for trolley rails is good.

Old Material—Business is quiet, but dealers hold for the same prices. No. 1 railroad wrought is $18@19; No. 1 yard wrought can be had for $17@18; machinery cast, $14@14.50; heavy steel melting scrap, $15@16.50. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. April 11.

Pig Iron—Everything seems to be at a standstill in the pig-iron trade and the numerous small transactions which are reported from day to day simply represent the normal conditions. The makers are indisposed to enter into arrangements for large deliveries and buyers are not anxious to anticipate remote requirements in the present unsettled condition of things. The fuel situation is still the subject of much anxious comment; the general feeling here is that there will be no need of coal when coal is wanted. Quotations for No. 1X foundry are $19 as an average; $18.50 for No. 2X; $18.50 for best No. 2 plain; standard forge, $16.50@17; basic $18; bessemer, $20.

Steel Billets—The inquiries for steel billets are of an urgent character. The quotations for forging steel are $34@35; for ordinary steel the closest quotation is $29.

Bars—The mills are busy making deliveries on old orders and there is just enough new business coming along for both common and refined iron to keep the industry in good humor. Steel bars are quoted at 1.63½ but prompt deliveries bring a tenth or more higher. Refined is $1.73½, which could be shaded on a large order.

Sheets—Prices are firm and there is a sufficient inquiry to keep mill people firm.

Pipes and Tubes—There is a fair demand for pipe and for boiler tube especially.

Merchant Steel—A recent canvass made by some agents of mills over this territory has resulted in quite an accumulation of merchant-steel orders.

Plate—The amount of business as measured by that of a month ago is a trifle higher, but the most of it is now made up of small orders for shop people.

Structural Material—The greatest activity prevails in structural material and the American Bridge Company is offered more business than it is conveniently able to take care of.

Steel Rails—The demand continues to surprise our railmakers. Contracts have been closed for about 75,000 tons and other contracts will be definitely closed today or tomorrow which will run the total close over 100,000 tons and there is double that amount of business standing in line awaiting opportunity to reach the ticket window.

Scrap—The scrap market is showing still farther activity and prices, while not quotably higher, are a little higher for certain kinds of scrap, such as No. 1 steel, machinery scrap and phosphorus scrap. Old iron rails are quoted nominally at $22 and railroad scrap at $20 per ton.

Pittsburg. April 10.

There is more activity in the pig-iron market than for several weeks, particularly in Southern iron. Some important sales have been made and there is a heavy inquiry. The sales just closed include lots of 10,000, 8000 and 6000 tons of Southern foundry No. 2 for extended delivery, but the prices were not made public. The Westinghouse Electric and Manufacturing Company has closed negotiations for 12,000 tons of foundry iron, 5000 tons for its Pittsburg and 7000 for its Cleveland works. The latter calls for 4000 tons of No. 2 and 3000 tons of No. 3. The Pittsburg contract calls for 1250 tons each of Nos. 1, 2, 3 and 4 grades, the No. 4 being Southern iron. The iron is for second half delivery and the price is said to be $16.85 delivered at Pittsburg and $16.25 delivered at Cleveland. For the Southern iron $13, Birmingham, is said to be the price. Another fairly important pig-iron transaction was the closing of a contract by the Shenango Furnace Company for delivering 1000 tons of bessemer iron a month for a period of one year, beginning April 1, to an interest at Monessen. The price for this iron is to be adjusted at the close of each quarter. The United States Steel Corporation, it has just been reported, recently took an additional 4000 tons of bessemer iron on its purchase from the Bessemer Pig Iron Association of 7000 tons of March iron at the same price, $17.25, Valley furnaces. The corporation likely will close with the association today for 15,000 tons of bessemer iron for April delivery, and the price is expected to be the same as was paid for the March iron. It is reported that a like tonnage will be taken for each month during the quarter. The coal-mining troubles will not seriously affect the iron trade. In the anthracite strike of 1902 the decrease in pig-iron production in dis-

tricts using anthracite coal was equal to only about 1 per cent. of the country's current make at present. Coke is a substitute and can more readily be obtained now than in 1902. So far as the Pittsburg district is concerned the strike will have no effect on the mills, as all the mines are running, the coal operators of this district having granted the demands of the United Mine Workers.

The American Sheet and Tin Plate Company today announced an advance of 10c. a box on tinplate to $3.60 a box, f.o.b. Pittsburg, 14x20-in. 100-lb. cokes. The company is operating 213 of its 252 tinplate mills, but will put its Sabraton works, a 10-mill plant at Morgantown, which has never been operated, on the active list next week. The idle plants are: Anderson, Ind., 7 mills; Gas City, Ind., 8 mills; Connellsville, Penn., 6 mills, and the Monongahela works, Pittsburg, 8 mills. The company is operating 90 per cent. of its sheet mills. No change was made in sheet prices and the market is very firm. Reports of shading in the West are discredited here, and while there is not much new business, the mills are filled with orders that will keep them busy for two or three months. The cotton-tie season opened formally last Thursday and most of the season's contracts have been closed. The producers are the Carnegie Steel, the Pittsburg Steel, Sharon Steel Hoop, Atlanta Steel Hoop and the Sheffield Rolling Mill companies. As told in this correspondence a couple of weeks ago, the season's business is estimated at about 1,750,000 bundles, of 45 lb. each, or a total of about 35,000 gross tons. The bulk of the business goes to the Carnegie Steel Company, which will furnish about 1,400,000 bundles. The price is the same as last year, 85c. a bundle. Orders for steel rails continue to come in, several thousand tons having been booked during the week. An improvement is noticed in the demand for light rails and the price on 25- to 45-lb. sections has been advanced $1 a ton to $29, but the price on lighter sections remains unchanged. A number of large orders for structural material were booked during the week and the mills are crowded. An indication of trouble developed today when the local organization of the International Association of Bridge and Structural Iron Workers sent to all members of the Pittsburg Erectors' Association copies of a new wage contract to go into effect on May 1. It provides for an advance of 50c. a day, a Saturday half-holiday and weekly pays instead of every two weeks, as at present. It is understood the members of the Erectors' Association will positively reject the demands and insist on an open shop. This is expected to result in a strike and the officers of the organization say they will fight. The strike against the American Bridge Company is still on, but the company has succeeded in doing a great deal of work with non-union men, and this week brought in a number of men from Louisville. The Jones & Laughlin Steel Company has completed its new shape mill. It will be put in operation this week and will have an output of about 8000 tons a month.

Pig Iron—Sales of pig iron for the week aggregate about 35,000 tons. The bessemer market is firm at $17.25@17.50, Valley furnaces, but foundry iron is weaker, No. 2 grade being quoted at $16.75, Valley, and for second half it is believed $16.50 can be done. Gray forge also is declining and $16.60, Pittsburg, is quoted.

Steel—The market is quiet. Bessemer billets are quoted at $27 and open-hearth billets and sheet-bars are firm at $28. Some new business in plates was booked this week and the price remains at 1.60c. Merchant-steel bars are quoted at 1.50c.

Sheets—Most of the sheet mills are filled up for two or three months and the market is strong. Black sheets remain at 2.40c. and galvanized at 3.45c. for No. 28 gage.

Ferro-Manganese—There is but little change in the market, 80 per cent. for prompt delivery ranging from $125 to $140 a ton.

Dusseldorf, Germany. March 26.

The German Iron and Steel Union reports the output of pig iron in Germany in February at 935,994 metric tons, a decrease of 82,467 tons from January. This was due to the shorter month, the daily average for February being 33,428 tons, against 32,854 tons in January. For the two months ending Feb. 28 the total was, in metric tons:

	1905. Tons.	Per Ct.	1906. Tons.	Per Ct.
Foundry iron	267,936	18.6	329,218	16.9
Forge iron	112,783	7.8	136,120	7.0
Steel pig	96,104	6.7	154,068	7.8
Bessemer pig	50,188	3.5	72,889	3.7
Thomas pig	911,671	63.4	1,262,160	64.6
Total	1,438,682	100.0	1,954,455	100.0

The increase in foundry iron this year was 61,282 tons; forge iron, 23,337; steel pig, which includes ferromanganese, spiegeleisen, ferrosilicon and all similar alloys, 57,964; bessemer pig, 22,701; Thomas, or basic, iron, 350,489 tons. The total gain was 515,773 tons, or 35.8 per cent. The output in the early months of 1905 was cut down by the coal miners' strike.

Brussels. March 19.

A semi-official summary of the iron and steel production of Belgium for the full year is as follows, in metric tons:

	1904.	1905.	Changes.
Foundry iron	99,350	99,740	I. 390
Forge iron	224,410	205,570	D. 18,840
Steel pig	963,840	1,004,980	I. 41,140
Total pig iron	1,287,600	1,310 290	I. 22,690
Wrought iron	355,190	380,360	I 25,170
Steel ingots	1,090,770	1,023,560	D. 67,210

The total output of iron and steel in finished forms is reported at 1,173,020 tons in 1904, and 1,192,530 tons in 1905; an increase of 19,510 tons last year.

Cartagena, Spain. March 24.

Iron and Manganiferous Ores—Messrs. Barrington & Holt report that shipments for the week were one cargo, 3200 tons dry ore, one cargo, 3750 manganiferous ore, and one cargo, 5150 tons Calasperra magnetite, to Rotterdam; one cargo, 2500 tons dry ore, and one cargo, 280 tons manganiferous ore, to Great Britain. New business is limited by scarcity of ore for sale. Freights continue low.

Quotations are 8s. 5d. for ordinary 50 per cent. ore; 9s.@9s. 4d. for special low phosphorus; 11s. 9d. for specular ore, 58 per cent. iron; 10s. 2d. for S. P. Campanil. Manganiferous ores range from 11s. 8d. for 35 per cent. iron and 12 manganese, up to 18s. 2d. for 20 per cent. iron and 20 manganese. All prices are f.o.b. shipping port.

Pyrites—Iron pyrites, 40 per cent. iron and 43 sulphur, are quoted 10s. 6d. per ton, f.o.b. Cartagena.

Bilbao, Spain. March 23.

An advance statement just issued shows that the production of iron ore in Spain in 1905 was the largest on record. The total ore mined and exported was as follows, in metric tons:

	1904.	1905.	Changes.
Ore mined	7,964,748	9.395,314	I. 1,430,566
Exports	7,291,941	8,590,482	I. 1,298,541

The exports in 1095 were: To Great Britain, 5,845,895 tons; Germany, 1,946,799; Belgium, 314,203; France, 251,716; United States, 213,203; other countries, 18,666 tons.

The production of iron and steel in Spain for the years named was as follows, in metric tons:

	1904.	1905.	Changes.
Pig iron	386,000	383,100	D. 2,900
Wrought iron	53,177	52,250	D. 927
Bessemer steel	93,100	113,664	I. 20,564
Open-hearth steel	100,659	124,200	I. 23,541
Total steel	193,759	237,864	I. 44,105

This shows a considerable gain in steel made. The most important manufacturing concern in the country is the Sociedad de Altos Hornos de Vizcaya, which is credited in 1905 with 209,000 tons of pig iron, 55,000 tons of open-hearth steel and all the bessemer steel made.

Heavy Chemicals and Minerals.

NEW YORK, April 11.

The quotations for heavy chemicals are shown in the table given herewith; and in particular:

Blue Stone (copper sulphate)—This has shown much activity lately; it is quoted as in the table given herewith.

Nitrate of Soda—We announced in our last issue the probable re-adjustment of the combination on the West Coast. This was confirmed by telegraph; but only a few details have been learned. However, in view of this, the market is very much excited, and prices are ad-

vancing, as quoted herewith. The indications do not favor the interest of the consumer; according to the figures of consumption and stocks now, as compared with those of a year ago, there is no surplus.

Oxalic Acid—There has been much interest in this recently, with sharp demand, and changeable prices. The imports increased steadily from 3,602,124 lb. in 1897; to 7,906,886 lb. in 1905.

Phosphate—The market is stiff on account of an apparent shortage for 1906; in accord with which quotations hold their own.

Potash Salts—New quotations were recently announced by the American agents of the German Kali Syndicate.

Thorium—The nitrate is quoted at $3.78 per lb., with a small rebate for large quantities (8c. per lb. for 1500 kilos). Monazite sand not quoted; market unsettled.

PRICES.

"Alkali," per lb., future	0.75@.87½c
" " " prompt	.85@.95c.
Soda ash, 48%, per lb	1.¼@1.3c.
Bicarb. soda, per lb	1.3@1.5c.
Bleaching powder, per lb	1.3c.
Soda, caustic, per lb., future	1¼@1.8c.
" " " April, May	2¼@3c.
Salt cake, per lb	.65c
Sal soda, per lb	.6@1.4c.
Soda, monohydrate, per lb	1¼@1¾c.
Potash, caustic, per lb	4½@6¼c.
" carbonate, 82-85%	3¾@4¼
Alum, per lb	1.75@1.9c.
Ammonia, aqua, 26 deg., per lb	4¾@5¾c.
Nitrate of soda, 100 lb. 96% for 1906	$2.35
" 95% for 1906	2.30
Saltpeter (pot. nitrate) per lb	4¾@5¾c.
Potash, muriate, per cwt	$1.90@$1.98
Potash, kainite, per long ton	$8.50@9.50
Potash, sulphate, 90%, 100 lb	$2.18@2.21¼
Sulphate of ammonia, per 100 lb	$3.05@3.07½
Hydrochloric acid, nominal, per lb	1.1c.
Hydrofluoric acid, 30% per lb	.03
48% "	.05
60% "	.11
Nitric acid, per lb	3¾@5¾c.
Sulphuric acid, 50°, bulk, per ton	$12 up.
60°, 100 lb. in carboys	1.00
60°, bulk, ton	18.00@20.00
66°, 100 lb. in carboys	1.00@1.25
66°, bulk, ton	21.00@23.02
Alcohol (ethyl) per gal	$2.45@$2.47
" (methyl or wood) 95%	$0.70
Arsenic, white, per lb., nominal	5½@8c.
" red, per lb	6½@6¾c.
Blue stone (copper sulphate), carload, per lb	6@6¼c.
Sulphur.	
Louisiana (prime) to New York, Boston or Portland, ton	$22.12½
To Philadelphia or Baltimore "	22.62½
Tin.	
Crystals, per lb., varies with metal	22¾c.
Pyrite.	
Domestic, furnace size, per unit	10½@11c.
Fines "	8@10c.
Imported, lump, non-arsenical, per unit	11¼c.
Imported, lump, arsenical, per unit	10¾@11c.
" fines, non-arsenical, per unit	10½@11c.
Imported, fines, arsenical, per unit	8½@9c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

Phosphates.	F. O. B.
*Fla., hard rock	$8.00@8.50
land pebble	4.50@5.00
†Tenn., 78@80%	4.60@4.65
78%	4.00@4.25
75%	3.75@4.00
68@72%	3.25@3.50
‡So. Car. land rock	4.00@4.25
" " river rock	3.75@4.00
Fla., hard rock guaranteed 77% phosphoric acid, to London, Rotterdam or Hamburg. 1907, per unit	7¾d.
Ditto to Stettin, 1907, per unit	8¼@8½d.
Ditto to Stettin, 1908, "	8½d.
Ditto, to Mediterranean ports, 1908, per unit	8¾d.

Prices for 1906 are merely nominal, as there is practically none to be had.

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Metal Market.

New York, April 11.

Gold and Silver Exports and Imports.

At all United States Ports in February and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Feb. 1906	$7,686,330	$2,083,938	Exp. $5,605,392
" 1905	14,794,312	2,192,919	" 12,601,393
Year 1906	13,427,995	4,689,647	" 8,783,348
" 1905	31,622,480	4,088,610	" 27,533,870
Silver:			
Feb. 1906	7,235,129	4,451,376	Exp. 2,783,753
" 1905	4,036,075	2,061,358	" 1,974,717
Year 1906	14,751,797	9,138,087	" 5,613,710
" 1905	8,400,820	3,983,560	" 4,417,260

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending April 7, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$ 51,500	$1,237,932	$ 864,175	$ 32,426
1906	3,192,425	3,300,918	19,237,977	535,687
1905	31,939,270	4,045,826	9,697,608	892,890
1904	5,173,267	1,556,923	12,949,545	207,661

Exports of gold for the week were chiefly to Panama; of silver to London. Imports of gold were principally from Germany; of silver from Mexico and South America.

The taking of $1,500,000 gold in London for shipment to New York is reported this week, and it is thought that more will follow soon.

The New York *Evening Post* of April 7 says: "For nearly 17 weeks New York bankers have been engaging in the interesting operation of swapping American gold for Mexican silver. The movement has reached remarkable proportions, because of the tentative agreement between our bankers and representatives of the Mexican Government to furnish at least $10,000,000 gold, and it has been no small factor in the money market. The first shipments of $1,750,000 were made in the last week of November, when silver was selling at 65¾c. per ounce here and 30 5/16d. at London. Since then the movement has been continued, owing to Mexico's needs in connection with the introduction of its new currency system. Much of the gold has been quietly shipped into Mexico from San Francisco and New Orleans so as to avoid the publicity attending a movement from New York."

It may be added that most of the silver thus drawn from Mexico has been re-exported, either to London or from San Francisco directly to the East.

The statement of the New York banks—including all the banks represented in the clearing house—for the week ending April 7, gives the following totals, comparison being made with the corresponding week of 1905:

	1905.	1906.
Loans and discounts	$1,090,759,600	$1,032,709,460
Deposits	1,128,100,700	1,003,441,300
Circulation	44,120,400	51,717,400
Specie	108,635,200	171,758,000
Legal tenders	82,672,500	76,541,700
Total Reserve	$290,707,700	$248,299,700
Legal requirements	282,025,175	250,860,325
Surplus reserve	$8,682,525	
Deficit		$2,560,625

Changes for the week this year were an increase of $7,205,500 in loans; decreases of $6,137,000 in specie, $1,767,200 in legal tenders, $849,200 in deposits and $127,600 in circulation. There was a deficit instead of a surplus, in the reserves, which fell below the legal requirement.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.	Total.
New York			$171,758,000
England	$185,879,045		185,879,045
France	584,965,065	$210,190,770	795,155,835
Germany	166,635,000	55,560,000	222,195,000
Spain	75,420,000	118,500,000	193,920,000
Netherlands	30,266,000	30,138,000	60,404,000
Belgium	16,630,000	8,315,000	24,945,000
Italy	141,485,000	19,278,000	160,763,000
Russia	460,995,000	24,015,000	485,010,000
Austria	229,620,000	64,170,000	293,790,000

The returns of the associated banks of New York are of date April 7, and the others April 6. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Shipments of silver in London to the East are reported by Messrs. Pixley & Abell as follows for the year to March 29:

	1905.	1906.	Changes.
India	£ 2,065,787	£ 5,015,610	I. £ 2,949,823
China	1,370		D. 1,370
Straits	2,800		D. 2,800
Total	£ 2,069,957	£ 5,015,610	I. £ 2,945,653

Receipts for the week were £8,000 from the West Indies, £229,000 in bars and £32,000 in Mexican dollars from New York; a total of £269,000. Exports were £253,700 to India.

Indian exchange is again easier, and the Council bills offered in London were taken at an average of 15.94d. per rupee. Abundance of money in India was the cause. There has been some buying of silver in London by the Indian Government.

The Treasury Department's estimate of the amount and kinds of money in the United States on April 1, is as follows:

	In Treasury.	In Circul'n.
Gold coin (inc. bullion in Treasury)	$229,462,034	$ 643,993,307
Gold certificates	54,916,250	489,830,619
Silver dollars	8,994,429	81,711,436
Silver certificates	4,618,305	465,110,695
Subsidiary silver	7,274,243	109,489,339
Treasury notes of 1890	25,905	7,768,095
U. S. Notes	9,156,935	337,524,081
Nat. Bank Notes	13,589,751	541,077,216
Total	$328,037,852	$2,676,504,788

Population of the United States on April 1 estimated at 84,311,000; circulation per capita, $31.75. Money held for redemption of gold and other certificates is not included in the Treasury statement.

The Treasury statement does not include deposits of public money in National banks to the credit of the Treasury, which amounted to $67,118,972 on April 1. The total amount in circulation shows an increase of $117,511,805 over April 1 last year.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.50	$0.53
Peruvian soles and Chilean	0.46	0.49
Victoria sovereigns	4.85⅛	4.87⅛
Twenty francs	3.87	3.89
Spanish 25 pesetas	4.78	4.80

SILVER AND STERLING EXCHANGE.

Apr.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Apr.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
5	4.8510	64⅛	29⅝	9	4.8425	64⅛	29 11/16
6	4.8475	64⅜	29⅜	10	4.8390	63⅞	29⅜
7	4.8475	64¾	29¾	11	4.8300	64⅛	29⅜

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine.

Other Metals

Daily Prices of Metals in New York.

April.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
5	18⅝ @18¾	18¼ @18½	84⅛	38¼	5.35	6.10	5.95
6	18⅝ @18¾	18½ @18⅝	84¼	38⅜	5.35	6.10	5.95
7	18⅝ @18¾	18¼ @18½	....	38⅜	5.35	6.10	5.95
9	18⅝ @18¾	18¼ @18½	84⅛	38⅝	5.35	6.05	5.90
10	18⅝ @18¾	18¼ @18½	84⅜	38⅝	5.35	6.05	5.90
11	18⅝ @18¾	18¼ @18½	84 3/16	38⅝	5.35	6.05	5.90

London quotations are per long ton (2,240 lb). standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

Copper—There is no change to be reported in this market, the undertone remaining very strong. Quotations at the close are 18⅝@18¾ for Lake copper; 18¼@18½ for electrolytic copper in ingots, cakes and wirebars; 18@18¼ for casting copper.

As to the speculative market in London, the corner in spot warrants still exists, but as no bear coverings took place last week, prices did not vary very much. They closed at £84 16s. 3d. for spot, £82 for three months.

Refined and manufactured sorts we quote: English tough, £85@86; best selected, £89; strong sheets, £96@97.

Exports of copper from New York for the week were 1087 tons. Our special correspondent reports the exports from Baltimore at 160 long tons of fine copper.

We are informed that copper is still going forward from the Lake smelters by rail, although the opening of navigation is so near. The wharves at the various plants are practically bare of copper in merchantable form, and the first vessels down the lake will find none to carry. Usually there is a large stock accumulated at the opening of navigation.

Tin—The London market is practically controlled by speculators, who have almost absolute possession of the ready supplies. In consequence of this the metal advanced considerably both in London and here, and closed at 38½@38¾ in this market, and £176 for spot, £171 for three months in London.

Lead—Transactions in this metal have been at a satisfactory rate and at unchanged prices. The largest interest is stil booking orders at 5.35c. for New York delivery, and 5.27½ for St. Louis.

It seems that in Europe quite a scarcity of supplies exists, in consequence of which prices have hardened in London, and closed at £15 17s. 6d. for Spanish lead, £16 for English lead.

St. Louis Lead Market—The John Wahl Commission Company telegraphs us on April 11, as follows: Lead is firm, but unchanged. Latest sales are on a basis of 5.25@5.27½c. for ordinary Missouri brands. Corroding lead is higher, being worth 5.40c. for Missouri brands.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of March 24, that silver has been 13.75 reales per ounce. Exchange is 28.97 pesetas to £1. Pig lead is 77.50 reales per quintal, equal, on current exchange, to £15 2d. per long ton, f.o.b. Cartagena. Shipments for the week were 307 tons argentiferous and 100 tons desilverized to Marseilles.

Spelter—This is extremely weak, the few orders presented being eagerly competed for. The market closed at 6.05c. New York and 5.90c. St. Louis.

The London market has also shown a tendency to harden somewhat, and closes steady at £25 12s. 6d. for good ordinaries, £25 17s. 6d. for specials.

St. Louis Spelter Market—The John Wahl Commission Company telegraphs us on April 11, as follows: Spelter is dull, and lower. Latest sales are on a basis of about 5.92½@5.95c., East St. Louis.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of March 24, that there is no change. Shipments for the week were 2350 tons blende to Antwerp.

Zinc Sheets—The price of zinc sheets is $7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars for Lasalle and Peru, in 600-lb. cases for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1906, have been as follows: Jan. 6, 1906, $8; Feb. 5, $7.75.

Antimony—remains exceedingly firm and scarce, spot supplies being very limited and closely held. Quotations range from 20½c. for ordinary brands to 21½c. for Cookson's.

Nickel—Quotations for large lots, New York, or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48c. up to 60c., also according to size of order and deliveries.

Platinum—Prices are still unsettled, the supply being irregular and the demand large. The current price is $25 per ounce.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to $43.50@44 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export. The London price is £7 7s. 6d. per flask, but jobbers ask £7 10s. for moderate lots.

Manganese Alloys—Prices for these alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 50 kg. delivered in Bremen, and are as follows, per 100 kilograms:

	Marks.
Manganese copper, No. 1, 30% Mn	275
No. 2, 28% Mn	180
No. 3, 20 to 25%, with 2 to 4% iron	165
Manganese tin, No. 1, 55% Mn., no iron	480
No. 2, 56% Mn., some iron	280
Manganese nickel, No. 1, free from iron	450
No. 2, traces of iron	270

Manganese metal is quoted at 3 marks per kg.—38.8c. per lb.—delivered in Bremen.

Minor Metals—For minor metals and their alloys, wholesale prices are f.o.b. works:

Aluminum.	Per lb.
No. 1, 99% ingots	35@38c.
No. 2, 90% ingots	33@35c.
Rolled sheets	44c. up.
Aluminum casting alloys	30@38c.
Aluminum-bronze powder	90@$1.00
Bismuth	$2.10
Cadmium, 99.5% f. o. b. Hamburg	92c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (75%)	12½c.
Ferro-Tungsten (37%)	29c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@98% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.) (oz.)	49c.
Phosphorus, foreign red	75c.
Phosphorus, American yellow	50c.
Tungsten (best), pound lots	90c.

Variations in price are chiefly due to size and conditions of order and deliveries.

Missouri Ore Market.

JOPLIN, April 7.

The restriction of output movement, started with the inauguration of the coal strike, has been withdrawn, and most of the mills closing down for this purpose will resume operations Monday, having decided that the output will be sufficiently restricted by the closing down of mines outside the area covered by natural gas mains, or beyond the reach of connection with the electric generating station. The mines of the Aurora, Alba and Neck City are nearly all out of coal, and most of the mills at these points are idle. Without speedy relief others will follow.

It is claimed that $52 per ton was paid for one bin of Duenweg ore. The highest price in Joplin was $50. The assay basis price is $43@47, and the average price $42.68.

Lead opened strong at $78, but weakened toward the end of the week, when offerings were $77.50 per ton with numerous sellers. The average price was $75.52.

Following are the shipments from the various camps for the week.

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,417,170	221,940	$62,710
Carterville-Webb City	1,339,730	703,220	56,190
Galena-Empire	1,231,240	240,330	34,130
Duenweg	491,670	222,380	19,260
Badger	766,770	.....	17,250
Granby	742,100	.....	17,060
Alba	445,000	36,000	8,400
Neck City	304,970	.....	7,010
Aurora	380,260	10,790	6,115
Carthage	191,990	44,040	6,085
Oronogo	261,790	1,040	5,305
Baxter Springs	.....	65,960	2,430
Spurgeon	87,430	26,780	2,110
Sherwood	53,510	4,550	1,370
Prosperity	30,800	17,400	1,290
Stott City	46,730	.....	1,010
Totals	8,791,160	1,594,370	$247,765
Fourteen weeks	137,217,400	19,523,100	$3,774,590

Zinc value, the week, $187,642; 14 weeks, $3,050,742.
Lead value, the week, 60,125; 14 weeks, 723,848.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	52.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	....	April	58.00	....
May	43.31	....	May	58.27	....
June	40.75	....	June	57.80	....
July	43.00	....	July	58.00	....
August	48.83	....	August	58.00	....
September	46.75	....	September	63.50	....
October	47.60	....	October	63.86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Wisconsin Ore Market.

PLATTEVILLE, April 7.

Change in the price of 60 per cent. ore was quite general throughout the district, the ruling price being $45. The ore reserves in the bins at the mills are increasing. The roads continue in a frightful condition. The ore loaded this week was from the mines that have side tracks at their plants. The ore-buyers report plenty of ore at the smelters, and it is apparent that they are taking great care not to overstock.

The little lead that was loaded brought top price, $37.50 per thousand. Sulphur and drybone same as last week.

The camps of the district loaded ore as follows:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur Lb.
Platteville	200,450	60,250	.....
Buncombe-Hazel Green	130,800	.....	.....
Linden	75,700	.....	.....
Highland	60,000	.....	.....
Rewey	53,000	.....	.....
Livingston	40,000	.....	.....
Mineral Point	51,200	.....	.....
Montfort	.....	.....	60,000
Shullsburg	.....	37,600	.....
Total	611,150	97,850	60,000
Year to Apr. 7	17,925,590	859,620	2,086,400

The coal situation promises to become serious at an early date.

Mining Stocks.

New York. April 11.

Dear money and the absence of outside orders have combined to make a dull market. The trading is still largely professional and money has been too high to make it profitable, with the public holding out.

Amalgamated Copper closed at $109¼; American Smelting common at $158. Tennessee Coal and Iron sold for $150, while $31 was paid for Republic Iron and Steel.

On the outside market dear money has had a considerable effect. United Copper was the most prominent mining stock; it was rather heavy, closing at $66¼ for the common. Mitchell Mining was dealt in around $12. Greene Copper closed at $31, while $17¾ was quoted for Nevada Consolidated.

On the Consolidated Exchange there was the usual miscellaneous business. Anaconda Gold sold at 14½c., while $1.55 was paid for Jim Butler; 45c. for Diamondfield; 24c. for Comstock.

Boston. April 10.

There have been no unusual events in the local market this week and mining shares have been quiet. Today, in sympathy with the break in Amalgamated, prices weakened, but only a few stocks showed any material decline. Amalgamated is off over $5 for the week to $107.50. Reports are current that the directors will put the stock on a 7 per cent. basis at the dividend meeting later this month. Copper Range is off over $2 to $79.75 and Franklin is off $1.25 to $19. This company's annual report was issued today and shows a surplus of $77,128 for 1905. The company's production was smaller than for 1904, due to the falling off in the product of the old Franklin and also by the miners' strike for about five weeks. The lowest price received for copper was 14.8c. and 16.5c. was highest.

Adventure rose $1 to $8.25 on buying in anticipation of an attempt to overthrow the present management at the annual meeting in June. A brokerage house is soliciting proxies for this purpose. The stock, however, is back to $7.25 again. Trinity took a $2 spurt, touching $12.50, on extra heavy dealings last week. Bids for calls at $15 until May 16 were made, which indicates that a deal of some sort is on. Tamarack, which advanced $3 to $112, fell back to $107.50 on news of another fire in the mine. Osceola is $2 lower at $103.50, but Quincy rose $4, to $100. Calumet & Hecla holds around $700. Wolverine $136, and Mohawk $61. Allouez stiffened $1 to $41, but reacted to $39, and Centennial is off $2.25 to $25.50. Bingham is off $2.37½ to $38.25. The annual meeting of the latter company, called for April 18, will be adjourned by request from the new ownership in this property.

North Butte ran off $3, to $82.50, recovering $1, and United Copper broke $5.25 to $64, rallying to $65. United States Smelting is off $3.75 to $58, but there is no significance in any of these declines. Utah Consolidated is also off $2.50 to $62. Boston Consolidated is fractionally lower at $23. It is reported that ground will be broken for the new concentrating mill for the Boston this week. Raven Mining furnished the sensation on the local curb by breaking to $5 today on sales of over 25,000 shares. The stock was up to $8.25 a week back.

Colorado Springs. April 7.

The local mining market has been quite active during the past week, and the trading has been pretty well distributed throughout the mine list, but with prices not much changed from those of one week ago.

The production for the month of March was considerably below the previous months, owing to the flooding of El Paso mine and the burning of the Portland shaft-house, and also the burning of the Dorcas mill. The total for the month is $1,452,250.

El Paso has remained quite firm at about the same quotation throughout the week, and closed today at 57¼c. Portland has sold up to $1.90, and closed today $1.85@1.90. Findley has made a gain, and is selling for 78½c. Vindicator is being traded in at 95, Isabella at 27, Golden Cycle at 75, and Work at 10c.

The Mary McKinney and Anaconda have agreed upon the basis of consolidation, and this will be effected at once. Portland has just declared a 5c. dividend, amounting to $15,000, which brings up their total to $6,607,080.50.

San Francisco. April 5.

Business in the Comstocks has been quite active, and more buying orders are reported. Some of these come from the

East, and certain brokers are trying to circulate reports of a movement to obtain control of the leading companies for New York parties, which may be, but does not look probable.

Dividends.

Company.	Payable.	Rate.	Amt.
Am. Smelting & Ref.	Apr. 16	$1.75	$875,000
Anaconda Copper	Apr. 19	1.12½	1,350,000
Granby Con.	May 15	0.30	400,890
Green Con. Copper	Apr. 18	0.40	345,600
International Nickel, pfd.	May 1	1.50	133,689
Kendall, Mont.	Apr. 2	0.03	15,000
Montana Ore Pur.	Apr. 30	10.00	810,000
Nova Scotia Steel & Coal	Apr. 1a	2.00	100,000
Penna. Salt Mfg. Co.	Apr. 16	3.00	180,000
Philadelphia Co.	May 1	0.75	434,296
Secramento, Utah	Apr. 2	0.00½	5,000
Tonopah Extension	Apr. 20	0.15	150,000
Tenn. C., I. & R. R. pfd.	May 1	2.00	4,960
Tenn. C., I. & R. R.	May 1	1.00	225,536
United Copper	Apr. 30	1.75	767,500
United Copper, pfd.	May 15	3.00	150,000
U. S. Smelt. & Ref., pfd.	Apr. 16	0.87½	.....
Vulcan Detinning, pfd.	Apr. 10	2.25	33,750

Assessments.

Company.	Delinq.	Sale.	Amt.
Blue Tent, Cal.	Apr. 25	.....	$0.10
Bullion	Apr. 30	May 21	0.05
Brown Stone, Utah	Apr. 22	Apr. 30	0.01½
Caledonia	Apr. 20	May 11	0.10
Challenge Con.	Apr. 17	May 8	0.10
Confidence	Apr. 11	May 2	0.20
Christmas, Utah	Apr. 16	May 5	0.00½
Crown Point, Nev.	Apr. 25	May 16	0.10
Gould & Curry	Apr. 3	Apr. 23	0.10
Idaho-Tonopah, Idaho	Apr. 25	May 14	0.001
Kismet, Cal.	Apr. 20	May 21	0.01½
Julia Con.	Apr. 9	Apr. 27	0.03
Kentuck Con.	Apr. 11	May 4	0.05
Scorpion	May 3	May 21	0.02
Sierra Nevada	May 7	May 28	0.10
Segregated Belcher	Apr. 5	Apr. 26	0.05
Sonora, Idaho	Mar. 31	Apr. 21	0.003
Tetro, Utah	Mar. 26	Apr. 20	0.01
Union Con., Nev.	Apr. 10	Apr. 30	0.10
Utah, Nev.	Apr. 18	May 9	0.05
Victoria, Utah	Apr. 24	May 15	0.00½
Yellow Jacket	Apr. 20	May 15	0.10

Tonopah Stocks. Apr. 11.

(Revised by Weir Bros. & Co., New York.)

	High.	Low.	Last.
Tonopah Mine of Nevada	18.75	18.50	18.62½
Tonopah Montana	2.95	2.90	2.92½
Tonopah Extension	10.37½	10.25	10.37½
Tonopah Midway	2.20	2.10	2.15
Tonopah West End	3.60	3.50	3.55
Goldfield Mining Co.	.57	.54	.56
Jumbo Mining	1.70	1.65	1.69
Red Top	1.80	1.70	1.75
Sandstorm	1.30	1.25	1.27
Montgomery Shoshone Cons.	17.37½	17.25	17.37½
Eclipse-Bullfrog	1.05	1.00	1.03
Denver-Bullfrog	1.70	1.65	1.68

St. Louis. Apr. 7.

Adams, $0.40—$0.25; American Nettie, $0.15—$0.10; Center Creek, $2.50—$2.00; Central Coal and Coke, $62 00—$61.50; Central Coal and Coke, pfd., $80.00—$78.00; Central Oil, $60.00—$55.00; Columbia, $1.50—$1.00; Con. Coal, $25.00—$20 00; Doe Run (old stock), $350.00—$300.00; Granite Bimetalic, $0.29—$0.20; St. Joe (old stock), $32.00—$30.00.

LONDON. (*By Cable.*) Apr 11.

Dolores, £1 17s. 6d.; †Stratton's Independence, £0 7s. 6d.; Camp Bird, £1 4s. 6d.; Esperanza, £4 1s. 6d.; Tomboy, £1 8s. 0d.; El Ore, £1 8s. 1½d.; †Oroville, £0 18s. 0d.; Arizona Copper, pf., £3 10s. 9d.; Arizona Copper, def., £3 9s. 3d.

*Furnished by C. Schumacher & Co., New York.
†Ex-dividend, 6d

PHILADELPHIA.

Cambria Steel	36⅜	36¾	35⅝	35¾
Philadelphia Co.	50½	50½	49½	49½
Tonopah	18¾	19	18½	18½

PITTSBURG.

Crucible Steel	15¼	15¼	15	15
Crucible Steel, Pref.	79½	80	79	80
Tonopah Ext.	10½	10⅝	10¼	10¼

STOCK QUOTATIONS.

NEW YORK. Week Apr. 10.

Name of Company.	High	Low	Clg.	Sales
Amalgamated	113	107⅛	107⅛	659,590
Anaconda	282½	261½	261⅛	194,600
Boston Copper	24	22¾	22¾	3,110
British Col. Copper	8⅛	7⅜	7⅜	6,250
Federal	182	180	180	200
Federal, Pf.	106½	103⅞	103⅞	1,320
Greene Copper	31⅛	30¾	30¾	15,200
Greene Gold	3⅝	2¾	2¾	8,950
Mitchell	12⅛	11¾	11¾	2,480
Tennessee Copper	48⅛	45¼	45¼	1,140
Union Copper	1 1/16	1 1/16	1 1/16	3,100
United Copper,	68⅞	64¼	64¼	42,100
United Copper, Pref.	100⅛	100	100⅛	217
Utah Copper	30⅛	28	28	2,550

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	162⅞	154⅞	154⅞	154,850
Am. Smelting & Ref., Pf.	122⅛	119½	119⅜	2,600
Col. Fuel & Iron	65¼	59¼	59¾	96,980
Pittsburg Coal	16⅝	14¼	14¾	400
" " pfd	59	59	59	100
National Lead	84⅝	80¾	80¾	29,739
Republic I. & S.	32½	29¾	29¾	7,000
Republic I. & S., Pf	103¾	102	102	7,500
Tenn. C. & I.	150¾	149½	149½	1,200
U. S. Red. & Ref.	26¾	25	25	750
U. S. Red. & Ref., Pf.	63¾	62½	62½	800
U. S. Steel	42¾	40½	40½	385,225
U. S. Steel, Pf.	108⅞	106½	106¾	84,006
Standard Oil	655	645	645	
Bethlehem Steel	32	28	28¼	

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Bamb. Delamar, 6¾—7; Butte Coalition, 36—38¾; Cumb. Ely Min., 6—6¼; Greene Gold-Silver, 2⅞—3¼; Mont. Shoshone, new, 17½—17¾; Nevada Con. Copper, 17¾—18½. (Boston) Adventure, 7½—8¼; Montana C. & C., 3¾—4; Nevada, 17¼—18⅛; Trinity, 10½—12½; U. S. Oil, 12½—13½; Wolverine, 135—136; Wyandotte, 1¼—1¾.

BOSTON.

Allouez	41¼	39⅞	39⅞	2,597
Amalgamated	112⅞	107⅛	107⅛	46,925
Atlantic	21⅛	21	25	845
Bingham	41⅛	38¼	38¼	4,470
Boston Consolidated	24⅛	23	23	6,330
*Calumet & Hecla	709	700	700	93
Centennial	28	25½	25½	1,070
Mercur	67	63	65	950
Copper Range	82	79¾	79¾	4,173
Daly-West	15	14	14⅝	1,640
Franklin	20¼	19	19	1,455
Granby	13½	13	13	1,915
Green Con. Copper	31½	30½	30½	11,816
Isle Royale	23⅛	22	22	850
Mass	9	8⅞	8½	460
Michigan	14	13	13	995
Mohawk	61½	61	61	1,005
*North Butte	85⅝	82½	82⅛	7,605
Old Dominion	45⅛	44	44	2 080
Osceola	105¾	103⅛	103⅛	2,255
Parrot	40⅛	37⅜	37⅜	1,413
Quincy	100	96	99	1,055
Rhode Island	6⅛	5⅛	5½	87
Shannon	7¼	7	7	2,193
Tamarack	112	107½	107⅝	219
Tecumseh	13½	12¼	12¼	688
*United Copper, com.	69⅜	66¾	66¾	10,785
U. S. Smg. & Ref.	61¾	58⅛	58⅜	4,222
* " " pfd	46	45¾	45¾	3,250
Utah	65	62	62	6,912
Victoria	9	8¼	8¼	1,215
‡Winona	8¾	8	8	790

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg
Elkton	42½	42½	40	41
El Paso	59½	59½	56⅜	56⅜
Isabella	27¼	27¼	26	26
Portland	200	200	180	180
Vindicator	96	98	94	94

SAN FRANCISCO.

Best & Belcher	1.15	1.30	1.15	1.25
Bullion	.30	.32	.30	.31
Caledonia	.37	.39	.37	.38
Confidence	.73	.90	.73	.90
Con. Cal. & Va	1.40	1.55	1.35	1.35
Gould & Curry	.35	.41	.29	.29
Hale & Norcross	1.30	1.30	1.05	1.05
Mexican	1.15	1.20	1.15	1.15
Occidental Con	.96	.96	96	.96
Ophir	5.50	5.75	5 37½	5.37½
Savage	1.10	1.30	.99	.99

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	66.108	28.047	30.464
March	58.046	64.597	26.794	29.854
April	56.600	.....	26.108	.....
May	57.832	.....	26.664	.....
June	58.428	.....	26.910	.....
July	58.915	.....	27.163	.....
August	60.259	.....	27.822	.....
September	61.695	.....	28.528	.....
October	62.034	.....	28.637	.....
November	63.849	.....	29.493	.....
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	New York.				London.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	15.008	18.310	15.128	18.416	68.262	78.896
Feb.	15.011	17.869	15.136	18.116	67.963	78.147
March.	15.125	18.361	15.250	18.641	68.174	81.111
April.	14.920	.....	15.045	.....	67.017	.....
May.	14.627	.....	14.820	.....	64.875	.....
June.	14.673	.....	14.813	.....	65.881	.....
July.	14.888	.....	15.005	.....	66.887	.....
Aug.	15.664	.....	15.725	.....	69.830	.....
Sept.	15.965	.....	15.978	.....	69.667	.....
Oct.	16.279	.....	16.332	.....	71.406	.....
Nov.	16.599	.....	16.758	.....	74.727	.....
Dec.	18.328	.....	18.398	.....	78.993	.....
Year.	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	29.325	36.390	July	31.760	....
Feb.	29.262	36.403	August	32.866	.....
March	29.523	36.662	Sept	32.095	.....
April	30.525	.....	Oct	32.481	.....
May.	30.049	...	Nov.	33.443	.....
June.	30.329	.....	Dec.	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	4.552	5.600	July	4.524	.....
Feb.	4.450	5.464	Aug.	4.665	.....
March.	4.470	5.350	Sept.	4.850	.....
April.	4.500	.....	Oct.	4.850	.....
May.	4.500	.....	Nov.	5.200	.....
June.	4.500	.....	Dec.	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £ 16.850 per long ton; February, £ 16.031; March, £ 15.922.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	6.190	6.487	6.032	6.337	25.062	28.225
Feb.	6.139	6.075	5.989	5.924	24.594	25.844
Mar.	6.067	6.209	5.917	6.056	23.825	24.563
April.	5.817	.....	5.667	.....	23.813	.....
May.	5.434	.....	5.284	.....	23.594	.....
June.	5.190	.....	5.040	.....	23.875	.....
July.	5.396	.....	5.247	.....	23.938	.....
Aug.	5.706	.....	5.556	.....	24.675	.....
Sept.	5.887	.....	5.737	.....	26.375	.....
Oct.	6.087	.....	5.934	.....	28.225	.....
Nov.	6.145	.....	5.984	.....	28.500	.....
Dec.	6.522	.....	6.374	.....	28.719	.....
Year.	5.882	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.